Communicating Climate Change

Discourses, Mediations and Perceptions

edited by **Anabela Carvalho**

Centro de Estudos de Comunicação e Sociedade
Universidade do Minho

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Mass media as a source of information about extreme natural phenomena in Southern Poland

Wojciech Biernacki, Anita Bokwa, Bolesław Domański, Jarosław Działek, Karol Janas and Tomasz Padło

Abstract

The paper presents the preliminary results of the project entitled 'Public attitudes and behaviours concerning extreme natural phenomena in Southern Poland', carried out in the years 2005-2008 at the Jagiellonian University in Kraków, Poland. The aim was to study the public perception of floods, strong winds and landslides in a representative group of Polish citizens, living in rural and urban areas, who experienced the mentioned extreme phenomena and those who did not. The frequency of occurrence of extreme phenomena influences their perception, which is then reflected in people's actions, e.g. those who experienced a few floods are much more careful about future flood predictions and undertake much more precautions to protect themselves than those who experienced only one flood event. Mass media are the preferred means of information and they play a key role in shaping the understanding of environmental problems. However, the quality of information in the media is usually rather poor and burdened with a strong negative emotional load.

Keywords: extreme natural phenomena, Southern Poland, mass media, public attitude

1. Introduction

Mass media are the main source of information about environmental issues for the adult part of society in most countries. They connect us with the part of the world which is beyond our personal observation and enlarge the scope of phenomena we can experience indirectly (McQuail, 1994). In Poland, mass media were owned and controlled by the state until 1989 when communism collapsed. Therefore, until the end of 1980s, the environmental information delivered to society was controlled and limited. Since 1990, an independent mass media market in Poland has developed, following the patterns known from Western Europe and USA. However, the process has been influenced by the same factors as the economic development of the country, e.g. weakness of the national economy, little financial potential of the national

investors, lack of formal regulations concerning many issues not known in the communist system or their constant changes. That is why Polish mass media should be rather perceived as being still in the process of creation, development and shaping. So is the public awareness and attitude towards environmental issues (Kocik, 2000). The present paper is an attempt at showing some links between those two elements.

2. Methods and materials

In the years 2005-2008, a project entitled 'Public attitudes and behaviours concerning extreme natural phenomena in Southern Poland' has been carried out in the Institute of Geography and Spatial Management at the Jagiellonian University in Kraków, Poland. The aim of the project was to study the public perception of floods, strong winds and landslides in a representative group of Polish citizens, living in rural and urban areas, who experienced the said extreme phenomena and those who did not. The analysed area included 6 of 16 Polish administrative regions ('voivodships'), located in Southern Poland (Podkarpackie, Małopolskie, Dolnośląskie, Świętokrzyskie, Śląskie and Opolskie 'voivodships') with a total area of 86,432,500 sq. km and 15,289,000 inhabitants (figures from 2005). Fifteen localities of various size and type were selected, which is shown in Table 1 and Figure 1.

Table 1. Localities in Southern Poland selected for the study.

Locality	Number of inhabitants	Type	'Voivodship'	Occurrence of:		
				flood	strong wind	landslide
Grabownica	3,000	village	Podkarpackie	X		
Porąbka Uszewska	1,300	village	Małopolskie	X		
Laskowa	2,700	village	Małopolskie	X		X
Ząb	1,300	village	Małopolskie		X	
Targanice	3,300	village	Małopolskie		X	
Lachowice	2,200	village	Małopolskie	X		X
Hucisko	370	village	Świętokrzyskie		X	
Jordanów	5,200	small town	Małopolskie			
Maków Podhalański	5,700	small town	Małopolskie	X		
Polanica Zdrój	6,700	small town	Dolnośląskie	X		
Kłodzko	28,500	middle-size town	Dolnośląskie	X		
Sandomierz	25,600	middle-size town	Świetokrzyskie			X
Ostrowiec Świętokrzyski	74,200	middle-size town	Świętokrzyskie	X		
Bielsko Biała	177,000	city	Śląskie			
Opole	127,600	city	Opolskie	X	X	

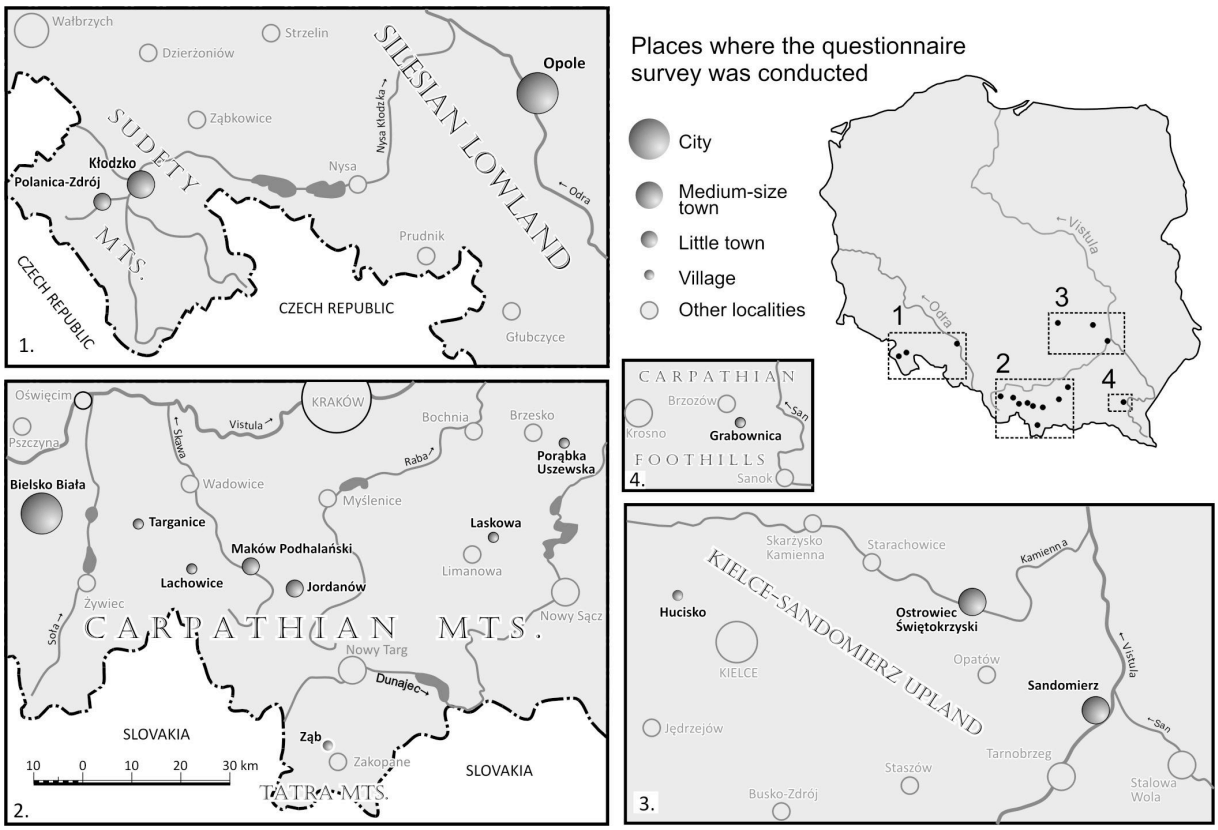

Figure 1. Maps with localities in Southern Poland included in the study.

In most localities, people experienced one or two kinds of extreme phenomena, but in two localities none of them occurred. The localities are of various sizes (from a village to a city) and are located in different geographical regions: the Carpathian Mountains, the Sudety Mountains, The Carpathian Foothills, Kielce-Sandomierz Upland, Sandomierz Basin, and Silesian Lowland. Another factor taken into consideration while choosing the localities for the study referred to the social links in the community connected with the duration of residence.

The selected extreme natural phenomena were those characteristic for Southern Poland. Floods of various sizes often occur in the mountains and landslides are typical for the Carpathians built of the Flysch complex. Strong winds are also typical for mountainous areas, but recently an increase in the occurrence of very strong winds and tornadoes (fortunately of much less spatial extent than those in North America) can be observed in non-mountainous areas, which used to be a very rare case so far. All mentioned phenomena are difficult to be predicted in terms of the time and place of occurrence and the possibilities of decreasing the loss risk caused by them are differentiated.

The first part of the study presented in this paper was carried out by means of questionnaires. Three different questionnaires were prepared, each to analyse a different extreme phenomenon. In every questionnaire, the first questions concerned the subjective perception of danger caused by the possible occurrence of a certain phenomenon and the frequency of its actual occurrence. Then we asked about the possibilities of obtaining support in case of occurrence of the phenomenon and the expectations concerning authorities responsible for that support. The next issue were the reasons of economic losses and possibilities of their diminishing. Subsequent questions concerned people's preparedness in case of occurrence of the phenomenon, including concrete actions undertaken by them. Then we asked about the sources of information about that particular phenomenon and preferred solutions concerning information flow. The questionnaire ended with questions concerning the person's direct experience of the phenomenon, duration of residence in the locality, age, gender, education, place of work and monthly income.

Table 2. Type of questionnaires distributed in the studied localities and rate of return.

Locality	Questionnaire type	Number of copies sent	Rate of return (%)
Grabownica	flood	200	38.5
Porąbka Uszewska	strong wind	200	54.5
Laskowa	flood, landslide	200 200	55.5 51.0
Ząb	strong wind	200	43.0
Targanice	strong wind	200	56.0
Lachowice	landslide	200	55.0
Jordanów	flood	200	57.0
Maków Podhalański	flood	200	51.5
Polanica Zdrój	flood	200	90.5
Kłodzko	flood	400	41.8
Sandomierz	landslide	280	61.4
Ostrowiec Świętokrzyski	flood	400	80.0
Bielsko-Biała	flood, landslide	400 200	48.0 68.5
Opole	flood, strong wind	600 200	66.8 36.5
Hucisko	strong wind	140	56.4

The presented sequence of questions allowed us to learn what people think and know about an extreme phenomenon, what they do to protect themselves against it and why (i.e. whether the knowledge and perception is translated into any real actions), and finally what are the sources of information, whether people see the need to learn more and how they would like to get more information. Therefore, the role of the mass media as a source of information about extreme phenomena is presented in the context of real local experience.

The questionnaires were distributed in 15 localities in the period from September to November 2006. Table 2 shows how many copies were delivered to particular localities and sent back. Totally, 4620 questionnaires were distributed via schools to the inhabitants of the selected localities and 2646 were filled in and returned, which gives the rate of return at the level of 57%. Most questionnaires (74.7%) were filled in by women, 58.4% of the respondents were 36-50 years old and 47.4% had secondary level education. In 71.3% of cases, the monthly income per person did not exceed 1000 PLN (about 260 EUR).

Finally, there were 1667 flood questionnaires, 459 strong wind questionnaires and 520 landslide questionnaires analysed.

3. Attitudes and knowledge about extreme phenomena

All flood questionnaires (1667 copies) were divided into three groups depending on the real occurrence of the flood in a certain locality and its presence in respondents' memories:

1. A few floods occurred in the last 10-15 years, including one really extreme flood, and over 50% of the respondents remembered that extreme one, while about 20% remembered more than one flood;

2. Only one extreme flood occurred in the last 10-15 years and over 80% of the respondents remembered it well;

3. No flood occurred in the last 10-15 years and about 60% of the respondents did not remember any flood.

In each group there were respondents from localities of different sizes and types. Direct experience of flood increases the sense of being endangered by that phenomenon and its possible reoccurrence (declared by about 75% in groups 1 and 2 and only 28.1% in group 3). It is also associated with the opinion that the floods cause now much higher economic losses than before (57% in groups 1 and 2 and 37% in group 3).

Out of the 1667 persons who filled in the flood questionnaire, 51.5% declared that they felt not well prepared for flood, while for strong winds the share was 56.4%. The smaller the locality, the higher percentage of people convinced to be little prepared for flood or strong winds/tornados. Strong winds are perceived as more difficult to be predicted than floods which is proved by the answers to the question about the possibilities of diminishing the economic

losses caused by extreme phenomena; 49.7% of the respondents declared that the flood losses can be partially diminished, while for strong wind losses the share was 40.1%. As many as 45.5% of the respondents declared that very little can be done in case of strong winds, while for floods it was only 11.9%. Again, the inhabitants of cities were more optimistic in their opinions than the persons from villages and small towns.

Most respondents (66.2%; 53.9% in villages and 74.7% in cities) are convinced that the main causal factor responsible for flood losses is a poor condition of the flood protection infrastructure and large investments would solve the problem (Table 3). The extraordinary size of flood is blamed by 19.9% of the respondents (24.2% in villages and 14.3% in cities), while only 13.8% points to wrong location of houses, built in the flood terraces (21.9% in villages and 13.0% in cities). The answers to that question, analysed in the three groups mentioned at the beginning of this section, show an interesting feature. In the localities from group 2, 70% of the respondents declare that the main factor is a poor condition of the flood protection infrastructure. In group 1, only 59% agree with it, while twice as many persons in group 1 admit that the main factor is a wrong location of houses.

Table 3. Main factor responsible for disastrous effects of floods (% of answers).

Type of locality	**Extraordinary size of flood**	**Poor flood protection infrastructure**	**Wrong location of houses**
village	24.2	53.9	21.9
urban area:	19.3	67.9	12.8
small town	23.9	60.6	15.6
medium sized town	21.7	68.1	10.3
city	14.3	74.7	13.0
mean	**19.9**	**66.2**	**13.8**

Therefore, we can conclude that in the areas where there were no floods recently, people strongly believe in the effectiveness of the flood protection infrastructure, while those who experienced the flood probably try to minimize their personal responsibility and look for causal factors either in the unpredictable nature of the event or in insufficient flood protection infrastructure. At the same time, they do not want to admit that the location of their houses may be of significant importance. That conclusion is additionally supported with the answers to the question concerning whether the respondents perceive the area where their houses are located

as endangered by the flood or not. In group 1, 64.7% of the respondents answered ‘yes’ while in group 2 it was only 30.4% and in group 3 the rate reached 83.2%.

4. Protection activities

Out of all respondents who filled in the flood questionnaire (1667 persons), 42.2% of them declared that their house was located in the area endangered by the flood occurrence. In that group, 18% of the respondents on average declared that they had undertaken activities to protect their houses against a flood (Table 4). However, the rate varied from 45.2% in villages to 7.4% in cities, so the larger the locality, the less is done in terms of individual flood protection. The same tendency can be observed in the case of individual protection against strong winds (23.5% in villages and 9.3% in cities). The protection activities realized by small groups of inhabitants are most popular in small towns (31.5%), which can be a result of strong social links in those communities. The protection activities were studied also in the groups of respondents defined in the previous section due to the flood occurrence. There is a significant difference between group 1 and 2. Persons from group 1 undertake protective actions almost twice as often as those from group 2, who have experienced only one big flood event.

Table 4. Respondents’ activity (in %) concerning protection against floods and gales (answers only from those who consider their house as located in areas endangered by floods or storms).

Type of locality	**Personal activities to protect their houses**	**Protection activities in small groups**	**Application to local authorities for flood protection**	**House protection against gales**
village	45.2	26.0	44.0	23.5
urban area:	14.7	16.0	16.4	9.3
small town	27.9	31.5	33.9	-
medium sized town	15.4	19.4	15.9	-
city	7.4	5.1	8.2	9.3
mean	**17.9**	**17.0**	**19.3**	**21.4**

The majority of the respondents (over 60%) are convinced that local authorities should organize and sponsor protective activities against floods (see Table 5). Only 17% of them declared that they should have done something themselves, together with their families, and 7% of them counted on their neighbours. However, in case of storms, the opinions were quite the opposite. About 70% of the respondents answered that individual actions are of greatest

importance, which is due to the technical nature of the protection facilities used against both hazards. People living in villages are much more willing to act on their own than the inhabitants of the cities.

Table 5. The main factor responsible for protecting households against floods and storms according to the respondents (% of answers)

Type of locality	Individuals with their families		Individuals with neighbours		Local authorities		Higher level authorities	
	flood	**storm**	**flood**	**storm**	**flood**	**storm**	**flood**	**storm**
village	27.4	70.5	3.6	5.7	51.8	18.2	17.3	5.7
urban area:	15.5	58.2	7.7	10.4	62.6	26.9	14.2	4.5
small town	21.3	-	10.8	-	56.7	-	11.1	-
medium sized town	12.9	-	9.2	-	66.5	-	11.3	-
City	13.9	58.2	4.2	10.4	63.2	26.9	18.7	4.5
mean	**16.9**	**68.5**	**7.2**	**6.4**	**61.4**	**19.6**	**14.6**	**5.5**

5. Mass media as the source of information

Personal experience is an important source of information about extreme phenomena. However, even in the areas often affected by floods, strong winds or landslides, only about 50% of the respondents point to personal observation as a source of information. The most popular source is local mass media, referred to by 68% of all respondents. The third source (in case of 24.8% of the respondents) is information acquired from the family members and friends. A surprisingly low rate of 5% is associated with school education. It is comparable with the impact of information distributed in the form of leaflets (5.7%). Information provided by schools is usually detached from the local environmental context, so it does not contribute much to increasing knowledge about the local environment. Besides, mass media have been a much more important source of current information for adults than school experience from many years ago (Burgess and Gold, 1985). Neither the frequency, nor the extent of economic losses had an impact on the presented pattern of answers. However, the pattern differed for the localities of various sizes and types. In villages, local mass media are the source of information about natural hazards for 60% of the respondents, while in cities for 82.4% of them. Personal observations are significant for 57.2% of the villages' inhabitants, while in cities it is only 39.8%. Finally, family and friends deliver information to 30.1% of people in rural areas and only to 18.5% in cities. The results prove that rural communities are much more dependent on natural phenomena than urban ones, and social links are much better developed there than in the

atomised urban social environment. This is also reflected in the answers to the question concerning preferred methods of environmental information flow. Inhabitants of villages prefer direct contacts and meetings (41.3%), while people living in cities would rather obtain necessary information via mass media (62.7%). The declared interest in various information sources did not depend on demographic features, financial situation or the place of work, which only proves the dominant role of local mass media among the indirect sources of information.

6. Discussion

The results presented above prove that the frequency of extreme phenomena occurrence influences the perception thereof, which is then reflected in people's actions. Those who experienced only one big flood try intensely to diminish the cognitive dissonance and deny that their houses are located in the area endangered by floods. That mechanism is known as a way of eliminating inconsistent and contradictory information when confronted with unpleasant facts or unavoidable phenomena (Aronson, 2002). Those people also act according to the threat denial response; they do not undertake actions aimed at improving flood protection infrastructure because they do not believe that such an extreme event can take place again during their lifetime (Shippee et al., 1980). Those who experienced a few floods are much more careful in such predictions and undertake much more precautions to protect themselves, which agrees with the results of Laska (1990).

Mass media play a key role in shaping the understanding of environmental problems by the inhabitants of Southern Poland, which complies with the results obtained in other countries (e.g. Stamm et al., 2000). Unfortunately, the quality of such information is usually rather poor and burdened with a strong negative emotional load. Polish mass media follow the pattern described by Mitchell (2000) and create concerns by overemphasizing the powerlessness of human beings when confronted with natural forces. Another important factor is the very limited time and space dedicated to environmental issues in Polish mass media, which is, among other factors, the effect of the lack of strong green lobby in Poland. What is worse, quite often correct information delivered by scientists is turned into the wrong one by the journalists who tend to oversimplify facts and detach them from the context (Biernacki, 2007; Bokwa, 2007). A good example is the disastrous flood of 1997 that affected 10% of Poland's territory. The media immediately adopted the terms: 'the flood of the century' and 'the flood of the millennium' and associated it with a false conviction that such flood could not happen in the next 100 or 1000 years.

Usually there is no analysis of the nature of a particular phenomenon or ways of protection against it in the mass media; instead, the inconveniences resulting from the phenomenon are stressed. Therefore, journalists increase the feelings of unexpected danger rather than help to build useful knowledge about natural phenomena (Biernacki, 2007). Piotrowski and Armstrong

(1998) argue that stories about natural disasters included in newspapers are much more detailed and in-depth than TV and radio reports. Unfortunately, it is not true in the case of Polish newspapers (Biernacki, 2007), which only proves their incomplete development mentioned earlier.

Mass media are the preferred way of obtaining information, which means that local authorities responsible for natural hazard risk management should consider using that powerful tool to a much wider extent than so far in order to raise public awareness and knowledge concerning extreme natural phenomena.

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References

Aronson, E. (2003) *The Social Animal*. New York: Worth Publishers.

Biernacki, W. (2007) *Obraz informacji przyrodniczych w mediach jako element konstrukcji wiedzy o świecie* (An image of environmental information in media as an element of world cognition construction; In Polish). Ph. D. dissertation. Jagiellonian University Library, Kraków, Poland.

Bokwa, A. (2003) 'Climatic Issues in Polish Printed Mass Media', *Studia Geograficzne Uniwersytetu Wrocławskiego* 75: 619-26.

Bokwa, A. (2007) 'Climatic Issues in Polish Foreign Policy', in P.G.Harris (ed) *Europe and Global Climate Change: Politics, Foreign Policy and Regional Cooperation*, 113-38. Cheltenham, UK, Northampton, MA: Edward Elgar.

Burgess, J. and Gold, J.R. (1985) *Geography, the Media and Popular Culture*. London: Croom Helm.

Kocik, L. (2000) *Między przyrodą, zagrodą i społeczeństwem* (Among nature, farms and society; In Polish). Kraków: Publishing House of the Jagiellonian University.

Laska, S. (1990) 'Homeowner Adaptation to Flooding: An Application of the General Hazards Coping Theory', *Environment and Behavior* 22: 320-57.

McQuail, D. (1994) *Mass Communication Theory: An Introduction*. London: Sage.

Mitchell, J.T. (2000) 'The Hazards of One's Faith: Hazard Perceptions of South Carolina Christian Clergy', *Environmental Hazards* 2: 25-41.

Piotrowski, C. and Armstrong, T.R. (1998) 'Mass Media Preferences in Disaster: A Study of Hurricane Danny', *Social Behavior and Personality* 26 (4): 341-46.

Shippee, G., Jeffrey, B. and Stuart, W. (1980) 'Dissonance Theory Revisited: Perception of Environmental Hazards in Residential Areas', *Environment and Behavior* 11: 209-26.

Stamm, K.R., Clark, F. and Reynolds-Eblacas, P. (2000) 'Mass Communication and Public Understanding of Environmental Problems: The Case of Global Warming', *Public Understanding of Scienc*e 9: 219-37.

Authors information

Dr. Wojciech Biernacki
University School of Physical Education, Faculty of Tourism and Recreation, 78 Jana Pawła II St., PL-31-571 Kraków, Poland. Email: wojciech.biernacki@interia.pl

Dr. Anita Bokwa
Dr. Anita Bokwa (corresponding author) is a climatologist interested in urban climate research and raising public awareness on environmental issues; a co-author of ESPERE Climate Encyclopaedia (www.espere.net)
Jagiellonian University, Institute of Geography and Spatial Management, 7 Gronostajowa St., PL-30-387 Kraków, Poland. Email: anita.bokwa@uj.edu.pl

Prof. Bolesław Domański
Jagiellonian University, Institute of Geography and Spatial Management, 7 Gronostajowa St., PL-30-387 Kraków, Poland. Email: b.domanski@geo.uj.edu.pl

Jarosław Działek, M.Sc.
Jagiellonian University, Institute of Geography and Spatial Management, 7 Gronostajowa St., PL-30-387 Kraków, Poland. Email: jarek.dzialek@uj.edu.pl

Karol Janas, M.Sc.
Jagiellonian University, Institute of Geography and Spatial Management, 7 Gronostajowa St., PL-30-387 Kraków, Poland. Email: kjanas@geo.uj.edu.pl

Tomasz Padło, M.Sc.
Jagiellonian University, Institute of Geography and Spatial Management, 7 Gronostajowa St., PL-30-387 Kraków, Poland. Email: t.padlo@geo.uj.edu.pl

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10

Media uses and social representations of climate change

Rosa Cabecinhas, Alexandra Lázaro and Anabela Carvalho

Abstract

A survey study with Portuguese participants (N=614) was carried out to investigate the relationship between practices of media consumption, the use of other sources of information, and social representations of climate change.

Results show a moderate level of knowledge about climate change, a high level of concern and a high level of perceived risk towards the potential effects of climate change, emotionally negative images associated with climate change, and low frequency of climate-friendly individual behaviour. News media are reported to be the main sources of information on climate change and are positively assessed in terms of credibility.

Practices of media consumption are a predictor variable of individual mitigation actions, behavioural intentions, concern about climate change and, in a smaller degree, knowledge about climate change. However, they have little impact on risk perceptions and on the emotional valence of the images associated with climate change.

Keywords: climate change, media, social representations, attitudes, risk

1. Introduction

Research on the relationship between mediated messages and social representations and behaviours points to many interconnected factors and a complex network of influences. Several studies have suggested that the media play an important role in heightening awareness and concern in relation to climate change with impact on behaviours being relatively unclear (Krosnick, Holbrook & Visser, 2000; Mazur & Lee, 1993). While citizens' knowledge of climate change has been the focus of various studies (Bord, Fisher, & O'Connor, 1998; Brechin, 2003; Dunlap, 1998; Stamm, Clark & Eblacas, 2000), including the relationship with media content (Bell, 1994; Corbett & Durfee, 2004), attention has also been directed in the last few years towards affective factors in people's understanding of the issue (Leiserowitz, 2005; Lorenzoni et al., 2006) and towards behaviour and behavioural intentions (e.g. Nave & Schmidt, 2002).

This paper reports on work carried out within the framework of social representations (e.g. Bauer & Gaskell, 1999; Jovchelovitch, 1996; Moscovici, 1961). Research findings regarding

cognitive, affective and behavioural dimensions associated with climate change (i.e. knowledge, concern and risk perception, actions and behavioural intentions) are here interpreted in that theoretical context. Social representation theory aims at understanding common knowledge, which is grounded in language and in daily life, and at explaining how scientific concepts are integrated into everyday thinking and action (Moscovici, 1984). Social representations are 'a set of concepts, statements and explanations originating in daily life in the course of inter-individual communications' (Moscovici, 1981: 181) and are influenced by both informal communication and the media. They integrate cognitions, affects and actions (Jovchelovitch, 1996). Similarly to the concept of attitudes, they comprise cognitive and affective dimensions, as well as behavioural intentions. The main distinction is that attitudes are generally conceptualized as an 'individual' state, even if influenced by the social environment, while processes of social construction and social sharing are central in social representations.

Several multi-nation studies have demonstrated that lay people's knowledge of the causes of climate change is low (e.g. Brechin, 2003; Dunlap, 1998), and that people seem to have a broader representation of environmental issues that does not distinguish accurately the factors involved in different problems. For instance, people often mention air pollution as a cause of climate change or global warming, and often confuse ozone depletion with climate change (Bord et al., 1998; Brechin, 2003; Dunlap, 1998; Stamm et al., 2000).

Concern with climate change is not as high as concern with other environmental problems, such as air and water pollution (e.g. Brechin, 2003). It has been shown that concern depends on weather conditions (people show more concern under bad weather conditions; Ungar, 1992) and increases with extended media coverage (Krosnick, Holbrook & Visser, 2000). People associate climate change with a moderate to high risk, but these risks tend not to be perceived as a personal threat (e.g. Lorenzoni, Nicholson-Cole & Whitmarsh, 2007). They are seen as stronger in distant places and in the future rather than in the spatial and temporal proximity of the respondent (Leiserowitz, 2005), or, in the case of a Portuguese sample (Cabecinhas, Lázaro & Carvalho, 2006), as strong both in distant places (hurricanes, tsunami) and locally (draughts, fires). Affective imagery associated with climate change is mostly negative and is dominated by melting ice caps, rising temperatures, destruction and diseases (Cabecinhas et al., 2006; Lorenzoni et al., 2006).

Regarding willingness to take individual action, people accept undertaking some effort to mitigate emissions (e.g. acquiring domestic appliances and cars that are more energy-efficient) but do not generally support policies that interfere greatly with the convenience of their daily life (e.g. using the car less, carpooling, decreasing the use of heating and air-conditioning; Bord et al. 1998; Nave & Schmidt, 2002).

Research has shown that cognitive dimensions (knowledge on climate change), emotional dimensions (affective dimensions such as concern, risk perceptions and mental imagery), and

behavioural dimensions (such as behavioural intentions and reported behaviour in the mitigation of climate change) are not coherently related. This has been termed as the value-action gap or the attitude-behaviour gap (e.g. Blake, 1999; Bord et al., 1998; Lorenzoni et al., 2007). For instance, Nave and Schmidt (2002) found out that people viewed climate change as a worrying problem and agreed that a solution was needed, but did not report using the car less and failed to recognize the importance of causes such as the use of fossil fuels and consumption of electricity.

Despite the fact that the media are considered a key source of information for the public about science issues (e.g. Nelkin, 1987), very little research has been done on the influence of media coverage of climate change on audience perceptions, attitudes and behaviours. Scholars in the USA have shown that people build meaning about unobtrusive environmental issues, such as climate change, mainly through the media (Wilson, 1995; Corbett & Durfee, 2004).

In this paper we report results from a survey study with a Portuguese sample conducted in 2007. The study investigated the relationship between patterns of media consumption and social representations of climate change and was based on the following research questions: How do practices of media consumption relate to perceptions of risk and responsibility and to attitudes towards climate change? What is the emotional valence of images spontaneously associated with climate change? What is the relationship between cognitive, affective and behavioural dimensions towards climate change? What are the predictor variables of climate-friendly attitudes and behaviours?

We report findings on media consumption and its effects on cognitive, affective and behavioural dimensions of social representations of climate change. The cognitive dimension was defined as the knowledge level about the causes of climate change; the affective dimension comprised concern about climate change, risks perceptions and mental imagery; the behavioural dimension addressed reported individual behaviour and individual behavioural intentions.

We expect the media to be the main source of information about climate change and patterns of media consumption to affect the level of knowledge about the causes of climate change and the affective involvement with climate change. We expect to find a gap between respondents' representations of climate change and their actions (intended or reported).

Socio-demographic variables such as sex, education, age and place of residence have not been shown to affect systematically lay representations of climate change (e.g. Dunlap, 1998). Accordingly, we do not expect our results to be significantly affected by those variables.

2. Method

Participants: 614 Portuguese people (308 women and 306 men); mean age = 30.59 (*SD* = 12.99; range 18-75 years); 237 living in rural areas and 377 in urban areas; with diverse levels of education, areas of professional activity and professional situations.

Materials: Questionnaire covering the dimensions analyzed in this paper – degree and patterns of media usage; attitudes towards information sources; knowledge of climate change, concern, risk perceptions, behavioural intentions and environment-friendly practices, and perceived barriers to perform them – as well as other dimensions, such as attributions of responsibility and perceptions of relative justice.

Procedure of data collection: The questionnaire was administered in March 2007 in the northern part of Portugal. Participation was voluntary. Response times ranged from 25 to 40 minutes.

Procedure of data treatment: after an exploratory descriptive analysis of the data, we performed a factor analysis to group the participants according to their patterns of media consumption.

The impact of patterns of media consumption and socio-demographic variables on social representations of climate change was analyzed by two MANCOVAS. For the first MANCOVA, the dependent variables were the following: a knowledge index of causes of climate change; risk perceptions and level of concern about climate change; and emotional valence of the images associated with climate change. For the second MANCOVA, the dependent variables were reported actions of mitigation of climate change and behavioural intentions. After exploring correlations between variables, we also conducted a series of Multiple Linear Regression Analyses (MLRA; stepwise method), in order to find the predictors for each of the dependent variables mentioned above.

3. Results

3.1. Degree and patterns of media use

Respondents were asked to rate how often they gathered information on climate change from different sources (5-point scale ranging from 1='very often' to 5='never'). As expected, the media topped the information sources on climate change (see table 1). Overall, the most used source was television news. Respondents reported to use it frequently and significantly more often than the other sources. The second most used sources of information were newspapers, followed by televised films and documentaries. The least used sources of information were books, publications and leaflets, and events (such as conferences and exhibitions).

Table 1. Use of sources of information on climate change

Sources of information	Mean (SD)	Factor 1	Factor 2
TV news	1.81 (1.81)		.810
Newspapers (printed or online)	2.29 (1.14)		.684
TV films and documentaries	2.57 (1.15)		.530
Family, neighbours, friends or colleagues	2.71 (1.06)		
Internet (excluding sites of newspapers, radios and TVs)	2.89 (1.36)	.772	
Magazines	2.89 (1.10)		
Radio	3.01 (1.14)		.645
School or university	3.36 (1.40)	.774	
Books	3.40 (1.10)	.680	
Publications or leaflets	3.41 (1.08)		
Events (conferences, exhibitions, etc.)	3.97 (1.05)	.701	
% of variance explained		38.15	12.72

Note: Mean ratings are based on a 5-point scale (1= very often, 5 = never); Factor Analysis: K-M-O measure of sampling adequacy = .818; Bartlett's test – Chi-Square = 1457.95; $p < .001$

Sources of information were divided into two factors obtained by an exploratory Factor Analysis (method varimax): 'more actively sought' sources of information (internet; school or university; books; and events) and 'mass media' (TV news; Newspapers; Radio; TV films and documentaries) – factors 1 and 2 in table 1 respectively. Together these factors explained 50.87 of the total variance (see table 1). Items with loadings lower than 0.5 were excluded from the factor. For each factor, respondents were divided according to the reported degree of use of sources of information on that factor: *heavy users* (above the median) and *occasional users* (below the median). For factor 1 the median was 3.50 and for factor 2 the median was 2.25. This distinction was used in other analyses.

3.2. Perception of sources of information on climate change

Participants were asked to rate the trustworthiness of sources of information about climate change in a 5-point scale ranging from 1='trust very much' to 5='do not trust at all' (see table 2). Overall, respondents expressed a high degree of trust in information coming from scientists and experts, followed by information from health professionals, environmental or consumer associations, the European Union and teachers. Respondents had some trust in media sources and people they know (family, friends, neighbours and colleagues), and expressed mistrust in information coming from sources such as government, local authorities and corporations.

Table 2. Trust in sources of information on climate change and assessment of their coverage of climate change

Trust in sources of information on climate change (5-point scale: 1= trust very much, 5 = do not trust at all)	Mean (SD)
Scientists/experts	1.46 (0.64)
Health professionals/doctors	1.77 (0.73)
Environmental/consumer associations	1.89 (0.73)
European Union	2.01 (0.77)
Teachers	2.01 (0.71)
Newspapers	2.05 (0.71)
Television	2.12 (0.72)
Radio	2.16 (0.69)
Journalists	2.17 (0.71)
Internet (excluding sites of newspapers, radios and TVs)	2.25 (0.71)
Family, friends, neighbours or colleagues	2.37 (0.70)
Government	2.67 (0.77)
Local authorities	2.72 (0.72)
Corporations	2.74 (0.78)
Assessment of the most used mass medium (5-point scale : 1= very good, 5 = very bad)	
Clarity of explanations of climate change	1.90 (0.70)
Accuracy of scientific and technological information on climate change	2.05 (0.73)
Analysis of policy and economic options to fight climate change	2.22 (0.73)

Globally, this pattern of results is in accordance with studies conducted before, both in Portugal (e.g. Lázaro, Cabecinhas & Carvalho, 2007) and in other countries. For example, a widespread mistrust in government, politicians and corporations has been found on studies conducted in the UK (e.g. Blake, 2001; Lorenzoni et al., 2007). In contrast, scientists, university and social networks are among the most trusted sources of information.

Participants were asked to indicate the medium they used most frequently as a source of information on climate change. The answers were, in order of importance: TV channels (76,4% overall; public service TV channels RTP 1 and RTP 2 - 52,1%; commercial channels SIC or TVI - 24,3%), newspapers (18%) and radio stations (2,2%). As the majority of the participants mentioned a TV channel we divided participants into three groups according to their choices: users of a public service TV channel; users of a commercial TV channel; and users of TV as a secondary mass medium. These categories were used in further analyses.

Participants were also asked to rate the medium they used most frequently in a 5-point scale ranging from 1='very good' to 5='very bad' regarding clarity of explanation of the climate change issue; accuracy of scientific and technological information; and quality of analysis of policy and economic options to fight climate change. Overall, the medium that was most used by each respondent was assessed as providing clear explanations of climate change, and accurate scientific and technological information (see table 2). The analysis of policy and economic options to fight climate change was seen as good. The level of alarmism in the news about climate change was rated in a 3-point scale ranging from 1='excessive' to 3='insufficient'. Overall, participants rated it as moderate (M = 2.01, *SD* = 0.47).

These results appear excessively positive in comparison to other studies (e.g. Lorenzoni et al., 2007) and might be partially explained by the fact that the survey was presented to respondents as linked to the Department of Communication Sciences of a well-known university in Portugal. This could have elicited a social desirability bias and produced less critical answers towards the media.

3.3. Knowledge of causes of climate change

Respondents were presented with six items and asked to say whether each of them was a contributing factor to climate change (see table 3). We computed a knowledge index by adding one point for each correct answer and dividing it by the number of items. The index ranged from 0 to 1. Results point to an overall moderate knowledge of the causes of climate change (M = 0.67; SD = 0.17), which is apparently better than the low level reported by previous studies (e.g. Brechin, 2003; Dunlap, 1998). However, the dichotomous scale that we used meant that the chance of choosing the right option was 50%.

Despite this moderate level of knowledge, people continue to show some confusion in relation to the causes of climate change, namely concerning the role of the ozone hole. In fact, only 5,7% of the participants gave the right answer concerning the item 'ozone hole'. The depletion of the ozone layer, which is a quite distinct problem from climate change and which experts do not consider as a cause of the latter, was the item that received the highest percentage of answers as a contributing factor to climate change (94,3%). This is a finding commonly reported in the literature (Bord et al., 1998; Brechin, 2003; Lázaro et al., 2007; Dunlap, 1998; Stamm et al., 2000).

Industrial processes (93.6%) and car use (93.6%) were correctly indicated as contributing to climate change. The loss of rain forests, car use, and the functioning of coal and oil power plants, which are also causes identified by experts, were considered contributors to climate change by participants in this study as well. However, 56% of participants considered that agriculture and animal husbandry do not contribute to climate change, when in fact they are

significant causes of greenhouse gas emissions. Overall, agriculture and animal husbandry was seen as the item with the lowest contribution to climate change (44.4%).

By emphasizing industrial processes and car use, these results seem to reflect a better understanding of the causes of climate change than the results from the Portuguese sample of the 1992 Gallup survey (Dunlap, 1998) – by then the major causes of global warming that were chosen by respondents were loss of rain forests (89%), nuclear power plants (85%), coal and oil power plants (83%), automobile exhaust (77%), aerosol sprays (67%), and refrigerators and air conditioners (45%). However, it must be noted that the questions posed in each of the questionnaires were slightly different.

Table 3. Knowledge of the causes of climate change

Percentage of respondents considering that this factor contributes to climate change	**%**
Ozone hole	94.3
Industry	93.6
Car use	93.6
Loss of forests	86.9
Functioning of coal and oil power plants	82.6
Agriculture and animal husbandry	44.4

3.4. Risk perceptions, emotional reaction and concern with climate change

General risk perceptions and emotional reaction to climate change

Respondents rated the likelihood of being personally affected by a set of factors, including climate change, using a 5-point scale ranging from 1='very likely' to 5='unlikely' (see table 4).

Table 4. Mean risk perception

Situation	Mean (SD)
Pollution	2.19 (0.94)
Climate change	2.22 (0.94)
Car accident	2.24 (0.97)
Cancer	2.48 (1.00)
Unemployment	2.50 (1.19)
Violent crime	2.88 (1.05)
Terrorism	3.34 (1.04)
HIV infection	3.37 (1.23)
Earthquake	3.38 (1.06)

Note: 5-point scale (1= very likely, 5 = unlikely)

Respondents considered that is likely that they will be affected by 'pollution', 'climate change' and will suffer a car accident (these mean values did not differ significantly). The likelihood of being affected by other factors was considered lower. These results show that Portuguese citizens consider climate change a serious personal threat and contrast with conclusions of earlier studies in other countries (e.g. Lorenzoni, Nicholson-Cole & Whitmarsh, 2007). The significant increase in the visibility of climate change in the media that took place in 2007 may contribute to explaining such a difference.

Participants were asked to freely associate words with 'climate change' and to rate the emotional valence of those words using a 5-point scale ranging from 1='very positive' to 5='very negative'. The emotional valence of the images associated with climate change was very negative (*M* = 4.45, *SD* = 0.79), which is enhanced by the feeling of vulnerability reported in the previous question. This result supports the view that participants see themselves as potential victims of climate change, as found in a previous study (Cabecinhas et al., 2006).

Concern with climate change

Respondents were asked how concerned they were with a set of environmental issues, including climate change, and answered in a 5-point scale ranging from 1='very much worried' to 5='not worried at all' (see table 5).

Table 5. Mean concern with environmental issues

	Mean (SD)
Forest fires	1.74 (0.75)
Air pollution	1.75 (0.79)
Decrease of forests	1.82 (0.81)
Ozone hole	2.05 (0.84)
Climate change	2.05 (0.83)
Lack of green spaces	2.35 (1.03)
Use of genetically modified organisms	2.69 (0.99)

Note: 5-point scale (1= very much worried, 5 = not worried at all)

Respondents reported a high level of concern with climate change and said they were very or moderately concerned with all the other issues presented to them. The exception was genetically modified organisms for which concern was situated at the middle of the scale. Participants showed a high level of concern with forest fires, air pollution and decrease of forests. Levels of concern with the ozone hole and climate change were exactly the same.

Perceptions of risk associated with the impacts of climate change

Respondents rated a set of possible consequences of climate change according to the level of perceived risk (5-point scale ranging from 1='very serious' to 2='not serious'; see table 6). All the possible consequences were viewed as very serious or as moderately serious. Draughts and health problems were the consequences rated as most serious; 'increased inequity between rich and poor countries' and 'increased forced migrations' were rated as least seriously.

Table 6. Mean risk perceptions for possible impacts of climate change

	Mean (SD)
Draughts	1.40 (0.66)
Health problems	1.42 (0.68)
Increase of hunger in the world	1.52 (0.87)
Flooding	1.54 (0.73)
Loss of animal and vegetable species	1.56 (0.81)
Sea-level rise	1.56 (0.83)
Hurricanes and storms	1.64 (0.77)
Desertification	1.66 (0.82)
Heat waves	1.73 (0.72)
Cold waves	1.73 (0.81)
Changes in agricultural production	1.99 (0.83)
Increased inequity between rich and poor countries	2.00 (1.01)
Increase of forced migrations	2.10 (0.94)

Note: 5-point scale (1= very serious, 5 = not serious)

3.5. Reported behaviours, intentions and barriers to action

Reported pro-environmental behaviours

Respondents rated the frequency of their pro-environmental behaviours in a 5-point scale ranging from 1='very often' to 5='never'. The most frequent reported actions were using less heating and air-conditioning (M = 2.39, SD = 1.23), and the separation of waste for recycling (M = 2.53, SD = 1.30). Saving energy at home is an appropriate behaviour to combat climate change so this is a positive finding, even if heating and air-conditioning are less needed in the Portuguese climate than in other countries; recycling is arguably more effective for other environmental issues than climate change. Respondents reported to make a rare use of public transport (M = 3.07, SD = 1.36). The results converge partially with the literature – recycling and energy conservation at home are the most frequent actions that people are willing to undertake (as summarized by Lorenzoni et al., 2007).

Behavioural intentions to fight climate change

Respondents were also asked to report the actions of mitigation of climate change that they had already undertaken or would be willing to adopt, using the following scale: 1 = already did, 2 = planning to do in the short-term, 3 = planning to do in the long-term, 4 = not planning to do; 9 = does not apply to my situation (see table 7). To replace conventional light bulbs with low-consumption bulbs is a mitigation action that most participants had already undertaken or intended to do in the short-term. Most participants also reported that they were planning to acquire more energy-efficient domestic appliances in the short-term. The installation of solar panels was a mitigation action that participants typically planned to undertake in the long term or did not plan to undertake at all. In sum, participants had already undertaken or were planning to pursue in the short-term actions that involved little financial investment; actions that involved more financial cost, like improving a house from an environmental point of view, were not planned for the near future or were not planned at all.

Table 7. Behavioural intentions towards actions of mitigation of climate change

	Mean (SD)
Replace conventional light bulbs with low-consumption bulbs	1.62 (0.93)
Acquire more energy-efficient domestic appliances	2.23 (1.07)
Take environmental aspects into account when acquiring high-budget items (e.g. a car, a house)	2.53 (1.02)
Improve insulation of home walls and roof	2.59 (1.11)
Install solar panels	3.23 (0.23)

Note: 4-point scale (1 = already did, 2 = planning to do in the short-term, 3 = planning to do in the long-term, 4 = not planning to do; 9 = does not apply to my situation)

Perceived barriers to engaging in mitigation actions

Respondents were asked to report why they did not do more to fight climate change by choosing any number of response options. Financial cost was the most chosen option (40.1% of respondents). Lack of information (32.4%) and lack of time (29.2) were also considered important barriers. Only 3.9% of the respondents mentioned that they did not do more because they were not worried with this issue; 16.6% did not believe that they could solve the problem; and 14.3% considered themselves too lazy to do more to fight climate change.

This pattern of results is consistent with the high level of concern about climate change reported in table 4, but also indicates that participants feel helpless and that they are not sufficiently informed about mitigation actions. The way the media have been reporting on climate change in Portugal may play a role here as useful practical information for reducing greenhouse gas emissions has rarely been made available. The internet obviously offers a wide

variety of approaches and depictions of climate change but the analysis of Portuguese websites suggests that the dominant discourse is a techno-managerial one with the emphasis on national and international regulatory mechanisms (Carvalho, 2007).

3.6. Effects of the use of information sources

Effect of the use of information sources on knowledge, concern, risk perception and affective imagery associated with climate change

We used a MANCOVA to analyse the effects of the use of information sources and socio-demographic variables on the cognitive and affective dimensions of social representations of climate change. Four factors were used: 'mass media' and 'more actively sought' sources of information (2 levels in each factor: high and low consumption of information), type of TV channel (3 levels: users of a public TV channel; users of a commercial TV channel; and users of TV as a secondary medium) and sex (2 levels: female and male). The covariate was the age of the participant.

The dependent variables were the knowledge index of causes of climate change, risk perception and level of concern about climate change, and emotional valence of the images associated with climate change.

We found that the type of use of information sources affected significantly the knowledge index ['more actively sought' sources: $F(4,533) = 3.37$, $p = .01$; type of TV channel: $F(8,1062) = 2.24$, $p = .01$]. *Heavy users* of 'more actively sought' sources (internet, school or university, books and events) showed a higher level of knowledge about the causes of climate change than *occasional users* [$F(1,533) = 6.57$, $p = .01$]. There was no significant difference amongst users of 'mass media' sources (newspapers, TV news, TV films and documentaries, and radio). Users of public service channels showed a higher level of knowledge than users of commercial channels [$F(2,533) = 3.58$, $p = .03$].

Patterns of use of information sources did not affect significantly the perceived likelihood of being affected by climate change and the emotional valence of the images associated with climate change.

The use of information sources affected significantly the level of concern with climate change. ['more actively sought' sources: $F(4,533) = 3.37$, $p = .01$, type of TV channel: $F(8,1062) = 2.24$, $p = .01$]. *Heavy users* of 'mass media' sources showed a higher level of concern about climate change than *occasional users* [$F(1,533) = 5.65$, $p = .02$]. Patterns of use of information sources did not significantly affect risk perceptions of the possible impacts of climate change.

The sex of participants had a significant effect on the combined dependent variables [$F(4,530) = 4.13$, $p = .01$]. Subsequent ANOVAs showed that women were more likely to consider that they could be affected by climate change [$F(1,533) = 3.78$, $p = .05$], were more concerned

[F (1,533) = 6.95, p = .001) and showed more negative affective images [F (1,533) = 8.34, p = .004] than men.

Interactions between variables did not produce a systematic pattern and therefore are not analyzed here.

As expected, we found that the type of use of information sources affected significantly the level of knowledge about the causes of climate change, with *heavy users* of 'more actively sought' sources showing more knowledge than *occasional users*, and users of public TV channels showing more knowledge than users of commercial TV channels.

Overall, the patterns of use of information sources did not affect the emotional aspects covered by our survey. These results contradict our expectations. The only exception was the level of concern with climate change: *heavy users* of 'mass media' sources showed a higher level of concern about climate change than *occasional users.*

Results might be explained by the very frequent media coverage of climate change in the Portuguese media in 2007, which may have produced a high perceived likelihood of being affected by climate change as well as motivated negative images even in occasional users.

Effect of the use of information sources on reported mitigating actions and behavioural intentions associated with climate change

This MANCOVA analysed the effects of the use of information sources and socio-demographic variables on the behavioural dimensions of social representations of climate change. It used the same factors and covariate of the previous analysis. The two dependent variables were mitigating actions and behavioural intentions associated with climate change, which were significantly affected by age [F(2,584) = 7.24, p =.01], 'more actively sought' sources of information [F(2,584) = 8.87, p =.01], 'mass media' sources [F(2,584) = 7.15, p =.001] and sex [F(2,584) = 3.42, p =.03]. Subsequent ANOVAs showed that: age significantly affects behavioural intentions [F(1,585) = 10.32, p < .01], which increase with increasing age (β = -.007, t = -3.21, p < .01); a higher consumption of 'more actively sought' sources of information increased the frequency of reported mitigating actions [F(1,585) = 13.76, p <.01] and behavioural intentions [F(1,585) = 7.84, p =.005]; a higher consumption of 'mass media' sources increased the frequency of reported mitigating actions [F(1,585) = 9.12, p =.003] and behavioural intentions [F(1,585) = 8.49, p =.004]. Sex did not produce a significant effect in a subsequent ANOVA.

The interaction between the use of 'mass media' sources and sex was significant [F(2,584) = 3.53, p =.03] and a subsequent ANOVA [F(1,585) = 6.33, p =.01] showed that reported mitigating actions are higher for women with high consumption of information than for men with high consumption of information.

3.7. Predictors of engagement with climate change

After exploring the correlations between variables, we conducted a series of Multiple Linear Regression Analyses (MLRA), stepwise method, in order to identify the predictors of each of the previously mentioned dependent variables (knowledge of causes of climate change, risk perception, level of concern about climate change, emotional valence of images associated with climate change, reported actions of mitigation of climate change, and behavioural intentions).

Knowledge about the causes of climate change was significantly predicted by two variables: level of schooling (β = .121, p < .003) and reported frequency of using 'more actively sought' sources of information about climate change (β = -.091, p<.027). These results show that knowledge about climate change increases with increasing level of schooling and *heavy users* of 'more actively sought' sources of information had higher knowledge than *occasional users*. However, the variance explained by this model is low (adjusted R^2= .027).

Two predictor variables were found for the perceived likelihood of being affected by climate change: respondents' sex (β = .115, p < .005) and the reported frequency of using 'more actively sought' sources of information about climate change (β = .087, p < .032). These results show that women feel more vulnerable about climate change than men and that *heavy users* of 'more actively sought' sources feel less vulnerable than *occasional users*. The variance explained by this model is low (adjusted R^2 = .022).

Level of concern with climate change was significantly predicted by two variables: frequency of using 'more actively sought' sources of information (β = .193, p < .001) and frequency of using 'mass media' sources (β = .142, p < .001). *Heavy users* of [both types of] sources of information felt more concerned about climate change than *occasional users*. The variance explained by this model is low (adjusted R^2 = .082).

Three predictor variables were found for reported mitigation actions: frequency of using 'more actively sought' sources of information (β = .194, p < .001); frequency of using 'mass media' sources (β = .129, p < .001); and level of concern with climate change (β = .170, p < .001). *Heavy users* of sources of information reported higher frequency of mitigation actions than *occasional users*; and the higher the level of concern the higher the frequency of mitigation actions. The variance explained by this model is low but higher than for the previously mentioned models (adjusted R^2 = .128).

Four predictor variables were found for reported behavioural intentions: frequency of using 'more actively sought' sources of information (β = .115, p < .010); frequency of using 'mass media' sources (β = .159, p < .001); age (β = -.188, p < .001), and level of knowledge about climate change (β = -.180, p < .001). These results show that *heavy users* of sources of information reported intentions to undertake mitigation actions in a higher degree than

occasional users; and that behavioural intentions increased with increasing age and knowledge. The variance explained by this model is low (adjusted R^2= .099).

Overall, socio-demographic variables had little impact on the results: sex affected only the affective dimensions, age affected the reported behavioural intentions and level of instruction affected the level of knowledge about climate change.

The degree and patterns of use of information sources revealed some significant impacts. Statistically significant correlations were found between practices of use of information sources and reported individual mitigation actions, as well as between use of information sources and behavioural intentions. Use of information sources was also associated with concern about climate change (the higher the reported frequency of use of information sources the higher the level of concern) and, on a smaller degree, with knowledge about climate change (the higher the reported frequency of use of information sources the higher the level of knowledge). However, practices of use of information sources appear to have little impact on risk perceptions and on the emotional valence of images associated with climate change.

However, the variance explained by the models is quite low, so we need to further explore the variables affecting levels of engagement with climate change.

4. Final remarks

As expected, social representations of climate change did not show a coherent pattern between knowledge, affective dimensions (concern, risk perception and affective images) and behavioural aspects, such as mitigating actions and behavioural intentions.

Our sample showed a moderate level of knowledge about the causes of climate change. Knowledge seems to be increasing slowly over the past 15 years – the Portuguese sample in the Gallup's 1992 survey showed a low level of knowledge (Dunlap, 1998). However, the majority of respondents did not recognize the contribution of agriculture and animal husbandry to climate change. Furthermore, there is still confusion about the role of the ozone hole, which respondents considered the main contributor to climate change. Recent studies conducted in other countries show that there is still a widespread association of the ozone hole with climate change (Kirby, 2003; Poortinga et al., 2006). This finding supports the view that people incorrectly relate climate change to other environmental issues, particularly stratospheric ozone depletion (Bostrom et al., 1994; Read et al., 1994) and that other dimensions (such as imagery) than knowledge are involved (Cabecinhas et al., 2006; Lorenzoni et al., 2006).

Knowledge of the causes of climate change was significantly affected by the patterns and degree of use of information sources: *heavy users* of 'more actively sought' sources revealed higher knowledge than *occasional users* and users of public service channels revealed higher knowledge than users of commercial channels.

Several affective dimensions were analyzed in this paper: general risk perceptions; concern with climate change; emotional valence of images freely associated with climate change; and risk perceptions about the possible impacts of climate change. Respondents rated the risk of being affected by pollution and by climate change as high in comparison with other risks. Respondents were very or moderately concerned with all the environmental issues presented to them. Concern with forest fires, air pollution and the decrease of forests was very high, followed closely by concern with the ozone hole and climate change. All the possible consequences of climate change were viewed as very serious or as moderately serious. Consequences on the 'physical' world (draughts, flooding) were rated as more serious than 'social' consequences ('increased inequity between rich and poor countries' and 'increased forced migrations'). The high levels of risk perception and concern with climate change were in accordance with the very negative emotional valence of the images spontaneously associated with the issue.

Emotional reaction to climate change was significantly affected by the sex of the respondents and, in some cases, by patterns and degree of use of information sources: women showed a higher level of risk perception, felt more concerned and evoked more negative images than men; users of public service channels revealed higher concern than users of commercial channels; *heavy users* of information sources revealed higher concern than *occasional users* (for both types of sources). This result does not allow us to conclude that a higher use of information sources causes more concern as it may instead be concern that motivates the search for information, which may in turn reinforce concern. Further research on the motives for media consumption for environmental issues, particularly climate change, should address the relationship between motives and types of consumption and the way they reinforce each other.

The level of behavioural intentions to fight climate change was relatively high. These results may be due to social desirability, but they suggest that people are aware that they can contribute to mitigating climate change through their individual behaviours.

Behavioural tendencies were significantly affected by patterns and degree of use of information sources: *heavy users* reported higher levels of actions and more behavioural intentions than *occasional users* (for both types of sources); users of public service channels reported higher levels of actions and more behavioural intentions than users of commercial channels. The reasoning presented above about levels of concern also applies here: uses of information sources and behavioural trends may have a circular cause-effect relationship.

Overall, there is a gap between the high level of concern, risk perception and affective imagery associated with climate change, on the one hand, and the frequency of mitigating actions, on the other hand. The perceived likelihood of being affected by climate change and levels of concern with the issue were very high (they increased considerably when comparing to an exploratory study conducted in 2006; Lázaro et al., 2007). Studies in other countries also found an increase in concern with climate change, particularly since 2003 (GlobeScan, 2006;

cited by Lorenzoni et al., 2007). However, reported actions and intentions are still lower than expected for such high levels of concern and moderate-high level of knowledge of the causes. Our findings are consistent with the widely reported 'value-action' or 'attitude-behaviour' gap (e.g. Blake, 1999; Kollmuss & Agyeman, 2002).

Responses to our survey also pointed to an inconsistency between behaviour and knowledge levels. We found that increasing knowledge of the causes of climate change led to greater behavioural intentions, but it did not affect both the actual mitigation actions reported, or concern with climate change. This is a point that requires further exploration as new data becomes available. Conceptually, we can be highly concerned about an issue as long as we are aware of it and regardless of the level of knowledge. However, to act adequately to address climate change requires knowledge of the correct mitigating behaviours.

Confronted with the question of why respondents did not fight climate change, they mentioned mainly individual barriers: financial cost involved, lack of information and lack of time. Other individual barriers have been suggested by research: lack of knowledge; uncertainty and scepticism; mistrust in information sources; externalising responsibility and blame; reliance on technology; climate change perceived as a distant threat; importance of other priorities; reluctance to change lifestyles; fatalism; and helplessness; together with social barriers such as lack of action by governments, business and industry; 'free rider effect'; pressure of social norms and expectations; and lack of enabling initiatives (Lorenzoni et al., 2007).

In conclusion, the media are the main source of information about climate change and practices of use of information sources have a significant impact on some dimensions of personal engagement with the issue – concern and, in a lesser degree, knowledge about climate change, as well as mitigating actions and behavioural intentions. However, the degree of use of information sources seems to have little impact on risk perceptions and on the emotional valence of images associated with climate change.

Further theoretical developments should focus on social factors. Social identity has been shown to be an important influence on people's pro-environmental behaviours (summarized by Lorenzoni et al, 2007) and literature on social representations emphasizes the role of interpersonal communication in the construction of a shared reality. Social representations are not simply given by the media or other sources of information. They are created and re-created in everyday social interaction (Moscovici, 1981). Analyzing social networks and social identity is a promising venue to understand lay people's engagement with climate change.

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References

Bauer, M. W. and Gaskell, G. (1999) 'Towards a Paradigm for Research on Social Representations', *Journal of the Theory of Social Behaviour* 29 (2): 163-86.

Bell, A. (1994) 'Media (Mis)communication on the Science of Climate Change', *Public Understanding of Science* 3 (4): 259-75.

Blake, D. E. (2001) 'Contextual Effects on Environmental Attitudes and Behaviour', *Environment and Behaviour* 33: 708–25.

Blake, J. (1999) 'Overcoming the 'Value-action Gap' in Environmental Policy: Tensions between National Policy and Local Experience', *Local Environment 4* (3): 257-78.

Bord, R. J., Fisher, A., and O'Connor, R. E. (1998) 'Public Perceptions of Global Warming: United States and International Perspectives', *Climate Research 11*: 75-84.

Bostrom, A., Morgan, M.G., Fischhoff, B. and Read, D. (1994) 'What do People know about Global Climate Change? 1. Mental Models', *Risk Analysis* 14: 959-70.

Brechin, S. R. (2003) 'Comparative Public Opinion and Knowledge on Global Climatic Change and the Kyoto Protocol: the U.S. versus the World?', *International Journal of Sociology and Social Policy 23* (10): 106-34.

Cabecinhas, R., Lázaro, A. and Carvalho, A. (2006) 'Lay Representations on Climate Change', *in Proceedings of IAMCR's 25th Conference*: 504-508. S.l.: IAMCR. [http://hdl.handle.net/1822/5335]

Carvalho, A. (2007) 'As Alterações Climáticas no Ciberespaço Português: Mediações dos Saberes e dos poderes' [Climate Change in the Portuguese Cyberspace: Mediations of Knowledges and Powers], *Revista de Comunicação e Linguagens* 38: 253-63.

Corbett, J. and Durfee, J. (2004) 'Testing Public (Un)certainty of Science: Media Representations of Global warming', *Science Communication* 26 (2): 129-51.

Dunlap, R. E. (1998) 'Lay Perceptions of Global Risk – Public Views of Global Warming in Cross-national context', *International Sociology 13* (4): 473-98.

Jovchelovitch, S. (1996) 'In Defense of Representation', *Journal of the Theory of Social Behaviour* 26: 121-36.

Kirby, D. A. (2003). 'Scientists on the Set: Science Consultants and the Communication of Science in Visual fiction', *Public Understanding of Science* 12: 261-78.

Kollmuss, A. and Agyeman, J. (2002) 'Mind the Gap: Why do People Act Environmentally and what are the Barriers to Pro-environmental Behavior', *Environmental Education Research* 8: 239-60.

Krosnick, J. A., Holbrook, A. L. and Visser, P. S. (2000) 'The Impact of the Fall 1997 Debate about Global Warming on American Public Opinion', *Public Understanding of Science 9*: 239-60.

Lázaro, A., Cabecinhas, R. and Carvalho, A. (2008) 'Perceptions of Climate Change Risks and Mitigation Behaviors: Understanding Inconsistencies between Representations and Actions', in B. Willard & C. Green (eds.) *Communication at the Intersection of Nature and Culture, Proceedings of the Ninth Biennial Conference on Communication and the Environment*: 264-75. Chicago: DePaul University. [http://www.esf.edu/ecn/coce2007prc.htm]

Leiserowitz, A. A. (2005) 'American Risk Perceptions: Is Climate Change Dangerous?,' Risk *Analysis 25* (6): 1433-42.

Lorenzoni, I., Leiserowitz, A., Doria, M. F., Poortinga, W. and Pidgeon, N. (2006) 'Cross-national Comparisons of Image Associations with 'Global Warming' and 'Climate Change' among Laypeople in the United States of America and Great Britain', *Journal of Risk Research* 9 (3): 265-81.

Lorenzoni, I., Nicholson-Cole, S. and Whitmarsh, L. (2007) 'Barriers Perceived to Engaging with Climate Change among the UK Public and their Policy Implications', *Global Environmental Change* 17: 445-59.

Mazur, A. and Lee, J. (1993) 'Sounding the Global Alarm: Environmental Issues in the US national News', *Social Studies of Science* 23: 681-720.

Moscovici, S. (1961) *La Psychanalyse, son Image et son Public*. Paris: PUF.

Moscovici, S. (1981) 'On Social Representations', in J. P. Forgas (ed.) *Social Cognition - Perspectives on Everyday understanding*: 181-209. London: Academic Press.

Moscovici, S. (1984) 'The Phenomenon of Social Representations', in R. Farr and S. Moscovici (eds.) *Social Representations*: 3-69. Cambridge: Cambridge University Press.

Nave, J. G. and Schmidt, L. (2002*) As Alterações Climáticas no Quotidiano: Estudo Comportamental de Curta duração. Relatório Final* [Climate Change in Daily Life: Short-duration Study of Behaviours. Final Report]. Lisbon: ISCTE.

Nelkin, D. (1987) *Selling Science. How the Press Covers Science and Technology*. New York: W. H. Freeman.

Read, D., Bostrom, A., Morgan, M.G., Fischhoff, B. and Smuts, T. (1994) 'What do People Know about Global Climate Change? 2. Survey Studies of Educated Laypeople,' *Risk Analysis* 14: 971–82.

Stamm, K. R., Clark, F. and Eblacas, P. R. (2000) 'Mass Communication and Public Understanding of Environmental Problems: The Case of Global Warming,' *Public Understanding of Science* 9: 219-37.

Ungar, S. (1992) 'The Rise and (Relative) Decline of Global Warming as a Social Problem', *Sociological Quarterly* 33 (4): 483–501.

Wilson, K. (1995) 'Mass Media as Sources of Global Warming Knowledge,' *Mass Communication Review* 22 (1-2): 75-89.

Authors information

Rosa Cabecinhas has a degree in Psychology, a Master's in Social Psychology and a PhD in Communication Sciences. Currently she is Director of the Master's in Communication Sciences at the University of Minho, Portugal. Her research interests include intercultural communication, social representations, social identity, gender and ethnicity.
Institutional affiliation and contacts: Centro de Estudos de Comunicação e Sociedade, Universidade do Minho, Campus de Gualtar, 4710-057 Braga, Portugal
Email: cabecinhas@ics.uminho.pt

Alexandra Lázaro has a degree in Psychology, a Master's in Communication Sciences and a PhD in Psychology. Currently she works as a statistical analyst in the Department of Health, England, and collaborates in research projects. Her research interests include cognitive psychology and social representations.
Institutional affiliation and contacts: Centro de Estudos de Comunicação e Sociedade, Universidade do Minho, Campus de Gualtar, 4710-057 Braga, Portugal
Email: alexandra.lazaro@gmail.com

Anabela Carvalho (PhD, University College London) has done research on various aspects of the communication of climate change. Her interests also include the mediated communication of science, political and social issues, political communication and discourse analysis. She is Assistant Professor at the University of Minho and Chair of the Science and Environment Communication Section of the European Communication Research and Education Association (ECREA).
Institutional affiliation and contacts: Centro de Estudos de Comunicação e Sociedade, Universidade do Minho, Campus de Gualtar, 4710-057 Braga, Portugal
Email: carvalho@ics.uminho.pt

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9

Framing climate change and climate-proofing:
From awareness to action

Joop de Boer

Abstract

This paper examines two contrasting mental models that can be used to frame climate change and climate-proofing (i.e. adaptation and mitigation). The models refer to common causes and common effects, respectively. Climate change may be relatively easy to grasp if it is conceived as a common cause of different changes in nature. That is important to raise public awareness of the issue. However, climate-proofing will involve a different mental model. This model should consider all the measures necessary to produce the common effect of a climate-proof country. In theory, such a mental model is far more difficult to communicate. These notions are illustrated with data from recent European surveys (Eurobarometer) on environmental and energy issues. The results suggest that the long-lasting rainfall and severe floods in Central Europe have had a significant impact on citizens' concerns. Climate change was often framed in a way that articulates its associations with rain- and river-based problems. This supports the notion of climate change as a common cause of different changes in nature. In contrast, it appeared that many citizens had only vague ideas about the energy situation in their country and that a clear frame for climate-proofing decisions is lacking.

Keywords: climate, frames, mental models, public opinion, European surveys

1. Introduction

In the years to come many new tools will have to be developed for communication and learning on climate change and, in particular, the options that can make a society more climate-proof (i.e. adaptation and mitigation). Taking the role of framing into account may significantly add to these tools, as climate change and climate-proofing can be framed and reframed in several ways. In the early 1990s, for example, many citizens of the developed countries saw the so-called 'greenhouse gas effect' or 'global warming' as an issue with potentially serious but geographically and psychologically distant consequences (Bord, Fisher and O'Connor, 1998; Bostrom, Morgan, Fischhoff and Read, 1994; Kempton, Boster and Hartley, 1995). Since then, however, various salient events, such as unusually long-lasting rainfall and severe floods in Europe, may have contributed to a reframing of the issue in terms of consequences that are much closer to people's personal lives. This change may be happening through a process of

formal and informal risk communication in which risks that were largely implicit are reframed into more explicit risks. As this process will not stop here, it is particularly important to get more insight into the frames that people use to make sense of climate-related issues. As part of a larger multidisciplinary study to support communication and learning on climate change, this paper introduces some key theoretical characteristics of framing. Additionally, it explores which frames the citizens of different Western European countries use to recognize and understand climate-related issues.

Frames are crucial micro-mechanisms in the continuous interactions between humans and the nonhuman natural world. Important insights into their role have been put forward by researchers in such varied fields as anthropology, linguistics, cognitive psychology, social and organizational psychology, management science, sociology, communication and media studies, social movements research, policy science, science studies, and philosophy. Due to disciplinary boundaries, however, much work has still to be done along the lines where these fields converge. The present paper takes as a starting point people's interaction with the environment near to them, such as the room they are sitting in and the newspaper they are reading (see Figure 1). In this inherently perceptual process, frames are the coordinate systems that people use to align data from their memory and data from the environment, for example, to interact with objects in a three-dimensional space (Di Nocera, Couyoumdjian and Ferlazzo, 2006). Similarly, with regard to perception and understanding of more abstract issues, the term frame refers to the organizing principles by which people develop a particular conceptualization of an issue or reorient their thinking about an issue (Chong and Druckman, 2007). In the literature on policy controversies (Schön and Rein, 1994), frames are often depicted in terms of 'underlying mental structures' of belief, perception and appreciation, which enable people to take shared or opposing political positions. Accordingly, frames are not just personal (and idiosyncratic) tools but also cultural structures.

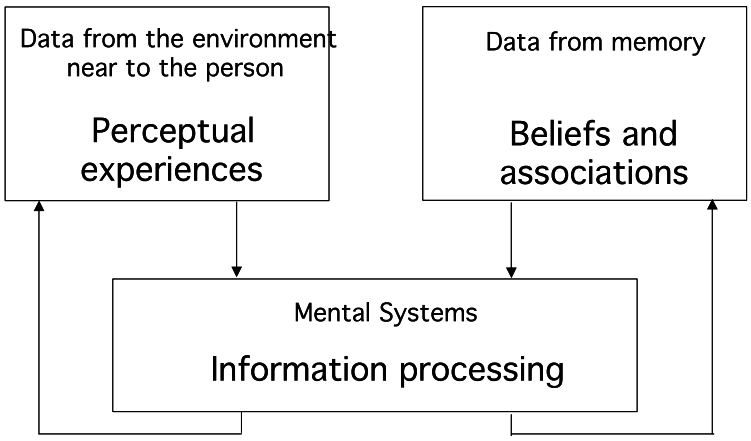

Figure 1. Frame-based information processing creates links between two data sets.

The main organizing principles for abstract information processing are language and mental models, including causal-chain structures, such as storylines. It is here that major differences may appear between people's beliefs about living kinds and artefacts. Recent research into children's thought processes has shown that even preschool children have intuitions about the essential properties of living kinds, which distinguish them from artefacts (Greif, Nelson, Keil and Gutierrez, 2006). One of these intuitions is the tendency to assume that living things have vital forces inside them that are responsible for growth and activity (Keil, 2006). In contrast, artefacts are developed to serve a function or a purpose. Preschool children, for example, do understand that dogs are different from tables. Dogs and other living kinds are seen as having an essence that works as a common cause of different dog-like phenomena (see Figure 2). In contrast, young children conceive of artefacts in terms of functions. Moreover, tables and other artefacts have to be assembled; their different constituting elements produce the table-like function as their common effect. People assume and prefer a common-cause structure regarding ‘natural’ categories (Ahn et al., 2001). Common-cause models are relatively easy to understand and can flexibly be extended or reduced. In contrast, common-effect models require more knowledge about the constituting elements and their mutual relationships.

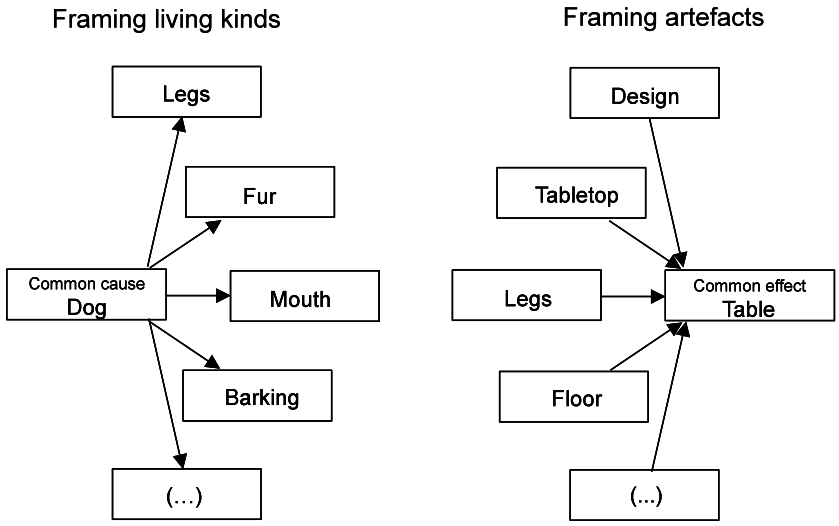

Figure 2. Examples of the dog's essence as a common cause and the table-like function as a common effect.

The common-cause model is not only relevant for purely natural phenomena, but also for people’s relationship to the habitable earth. Many stories about this topic have been collected in Glacken's (1967) seminal book on nature and culture in western thought from ancient times onwards. Each of these stories appears to capture one or more of the following themes: (1) the idea of a designed earth that constitutes a fit environment for human beings and other organic

life, (2) the idea of geographical influence on the character of human culture ('geographical determinism'), and (3) the idea of humans as geographic agents who changed the earth from its hypothetical pristine condition. In the past centuries, the stories had strong moral undertones. Many unusual natural events, for instance, were seen as cues that something unpleasant is going to happen ('omen of disaster'). During the Little Ice Age (from around 1300 until about 1730), certain 'unnatural' climatic events were not only attributed to large-scale deforestation but also to the weather-making abilities of witches (Behringer, 1999).

In modern times, the idea of humans as geographic agents is partly captured by a global model of environmental pollution. Basically, this is a common-cause model of the several ways in which human activities may threaten the essence of nature. The old notion of the balance of nature may reinforce the worry that modern humans are playing with things they barely understand. Kempton et al. (1995) suggest that many citizens of the United States applied a pollution model to climate change. Global warming was often seen as a subset of ozone depletion, due to overlapping features and the fact that the ozone issue was established first.

The common-cause model may help people to become aware of the many ways in which climate change can become manifest, such as by changes at the North pole, in the Alps, in sea level and in patterns of rainfall. This may happen even if their understanding of these issues is not completely in line with established scientific knowledge about differences between climate change and ozone depletion. However, making a country climate-proof by adaptation and mitigation measures requires a completely different mental model. Climate-proofing should be driven by opportunities for technological, institutional and societal innovations, rather than purely by fear of the negative effects of climate change (Kabat, van Vierssen, Veraart, Vellinga and Aerts, 2005). Therefore, climate-proofing is a common effect of different constituting elements that have to be balanced carefully. The contrast between the two mental models is illustrated in Figure 3.

Because frames and mental models cannot be observed directly, their role in information processing has to be derived from comparisons of different situations, such as different sites where people are trying to make sense of what happens in their environment. In the case of climate change, for example, research may focus on comparing people who live in areas with different ecological and cultural circumstances. Interestingly, several recent multi-national public opinion surveys allow us to make such comparisons. This refers to some large data sets, such as the Eurobarometer surveys of the European Union, which are not specifically built for research into beliefs about climate change but which can fruitfully be used for that purpose. Although some data sets include a large number of countries, it was decided to focus the analysis on the countries that belong to Western Europe (i.e. the former EU 15 countries plus Norway and minus Greece).

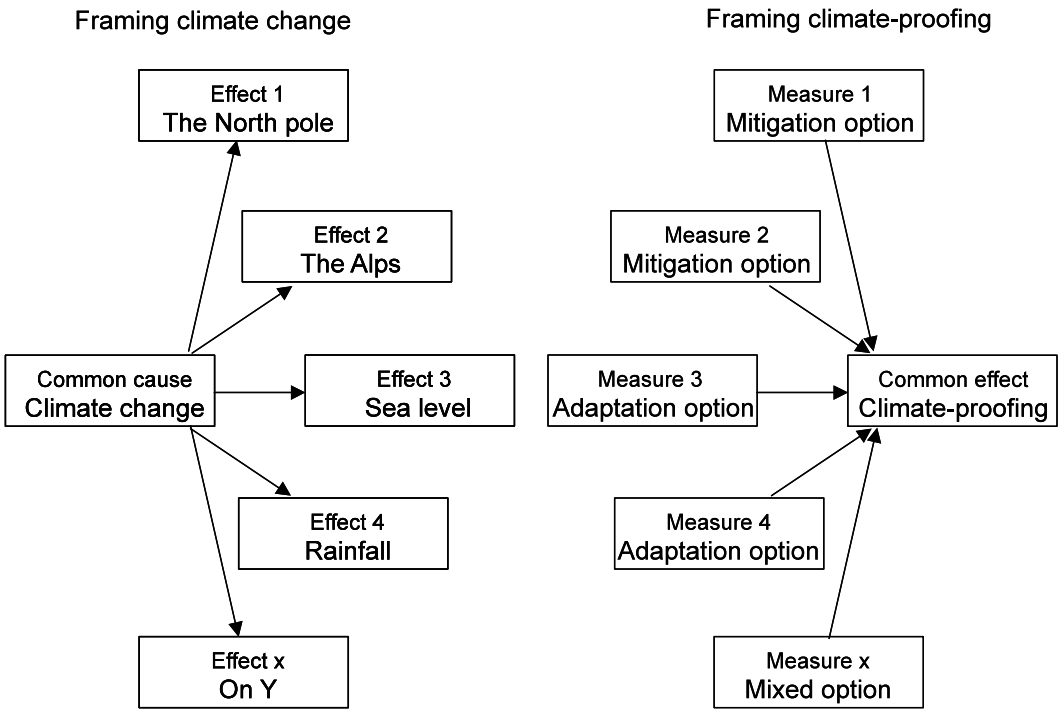

Figure 3. Climate change is a common cause; climate-proofing is a common effect.

A particular advantage of the data sets is that concerns about climate change can be examined in the context of concerns about other environmental issues, such as ozone depletion or natural disasters, and beliefs about energy technology. Hence, the research questions were: (1) is it possible to separate worry about climate change from worries about other environmental topics, (2) to what extent are citizens worried about climate change, (3) do citizens see linkages between climate change and energy, (4) what do these linkages indicate about their mental models?

2. Method

Two large data sets were chosen that allow us to put climate-related framing by the citizens of Western European countries in a broader environment and energy perspective. These are (1) Eurobarometer 58, conducted between 1 September 2002 and 7 October 2002 (after the August 2002 flooding in the Elbe and the Danube catchment areas) and focused on attitudes towards the environment (European Commission, 2002); and (2) Eurobarometer 57 (without Norway), conducted between 23 February and 4 April 2002 and focused on attitudes towards energy and energy technology (European Commission, 2003). Both data sets were documented and made available by the 'Zentralarchiv für empirische Sozialforschung, Köln'. From each set, the most relevant questions about climate-related worries and beliefs were taken.

Clearly, multi-national data should be handled with great care. A crucial methodological point is that each country should be seen as a set of conditions, such as latitude, language, religion, education, and wealth (Scheuch, 1989), which makes it difficult to pinpoint exactly how the differences between the countries should be explained. In addition, differences in public opinion between countries are often less stable than the sample sizes (approximately 1000 persons per country) may suggest. Comparisons may also be hampered by differences in language and ways in which people answer survey questions. For instance, questions that are intended to measure people's level of concern about environmental issues may generate a tendency to show a certain degree of concern about all the issues. In Europe, this tendency may be more widespread in the countries of the south than in those of the north (European Commission, 2002; van Herk, Poortinga and Verhallen, 2004).

Therefore, several statistical techniques were applied to adjust the scores for differences in response tendencies. A useful technique is multidimensional scaling by PROXSCALE (SPSS, 2003), as the results are not influenced by overall score level differences in different groups. In addition, multiple regression analysis was used to transform the degree of worry about climate change into standardized residuals that were made independent from worries about other environmental issues. For purposes of presentation the data per country are arranged in an order that takes due account of their latitude and language, from Southern to Northern Europe.

3. Results

One of the potentially relevant ways of viewing climate issues is by putting them in the broader context of all the main environmental issues of our times. In Eurobarometer 58, respondents were asked to indicate their level of worry about 25 environmental issues, ranging from 'destruction of the ozone layer' to 'industrial waste management.' The technique of multidimensional scaling was used to place related worries together and non-related worries further apart. In the solution presented in Figure 4, four dividing lines were drawn on the basis of another analysis (Principal Component Analysis with oblique rotation of the first four correlated components; sharing 61 % of the common variance, all Eigenvalues >1).

The results presented in Figure 4 indicate that there were clear patterns of worries among the citizens of the countries involved. In fact, all the environmental worries could be arranged in four broad clusters, which may be characterised as follows. Water pollution (e.g. rivers, coasts, ground and tap water) and industrial disasters (e.g. oil spills) make up the first cluster. The second one refers to some global environmental issues and includes climate change together with natural disasters and the ozone issue. The third cluster contains local issues and topics that appear to worry urban people in particular (e.g. hunting). The fourth cluster largely involves worries about potential hazardous activities, including the use of nuclear power and the management of chemical waste.

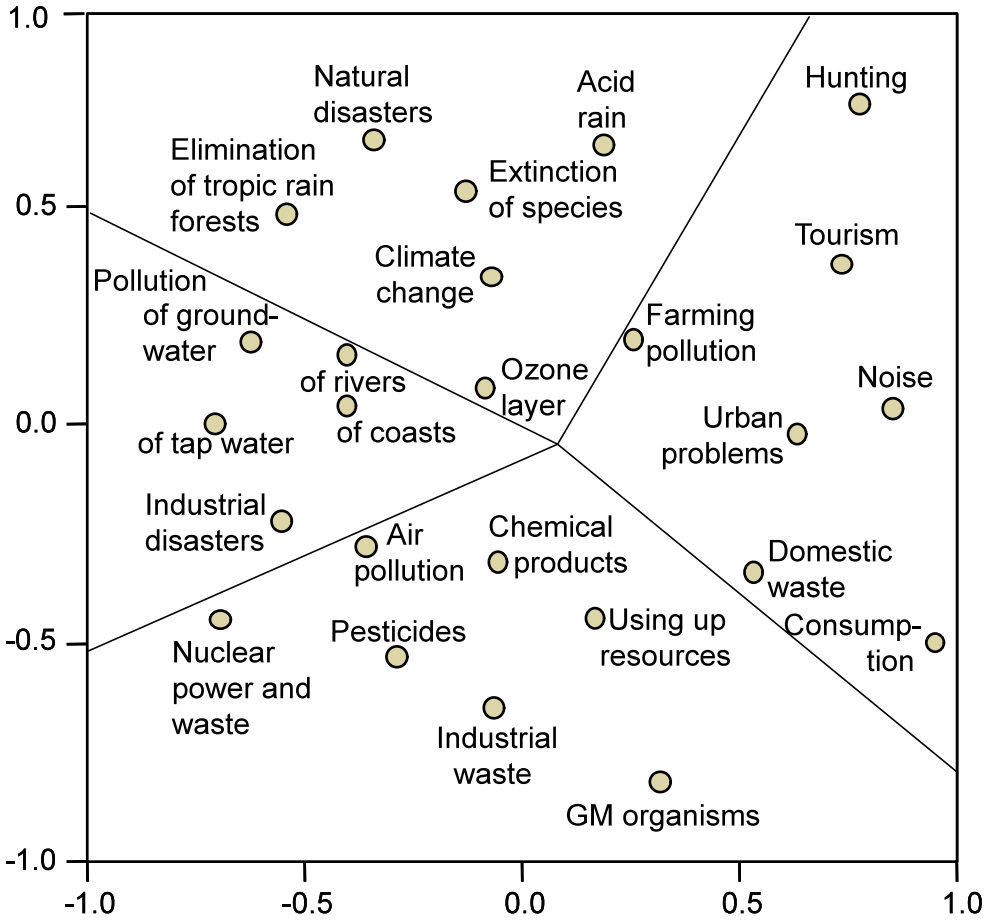

Figure 4. Multidimensional scaling of the worries[1]) taken from Eurobarometer 58 (*n* = 16054, Normalized Raw Stress .089).

[1]) Question 39: 'At present, are you very worried, fairly worried, not very worried or not at all worried about (…)'.

The set of clusters showed that it was possible to separate worries about global environmental issues from the other ones. Citizens who were relatively more worried about climate change were often also relatively more worried about topics such as deforestation, extinction of species, natural disasters and ozone depletion. This pattern of associations may be the result of a common-cause model of thinking about global issues. Further, the set of clusters was used to shed more light on the relative level of worry about climate change and natural disasters. That is, a multiple regression analysis was applied to transform the degree of worry about climate change into standardized residuals that were made independent from worries about water pollution, hazardous activities and local issues. The same analysis was applied to the degree of worry about natural disasters.

Figure 5 displays the results of the analyses per country after standardization across the data set as a whole. It appears that the level of worry about climate change was relatively high in the countries of Central Europe. This pattern of results corresponds with higher levels of worry about natural disasters and, as depicted in Figure 6, higher partial correlations between both worries.

The results of Figures 5 and 6 should be seen in relation to the long-lasting rainfall and severe floods that have stricken Central Europe since 1990. These events may have had a significant impact on people's worries about climate change. Among the citizens of countries as Austria and Germany, the levels of worry about climate change and natural disaster were relatively high and both items were significantly correlated. In these and other countries worry about natural disasters was higher in rural areas than in large towns.

Interestingly, a river-oriented pattern was also found in the Netherlands, where 60% of the territory is located below sea level and 70% of the gross national product is earned in these flood prone areas (Kabat et al., 2005). The highest correlation between worry about climate change and natural disasters was found among citizens in the provinces that are river-oriented (r = .34, n = 524, p < .001) instead of coast-oriented (r = .23, n = 474, p < .001). This outcome is not really surprising, as the past decade has revealed that certain parts of the Netherlands are very vulnerable to river-based floods. However, especially in the lowlands with their long coastline, climate change may have much more consequences than rain- and river-based problems only.

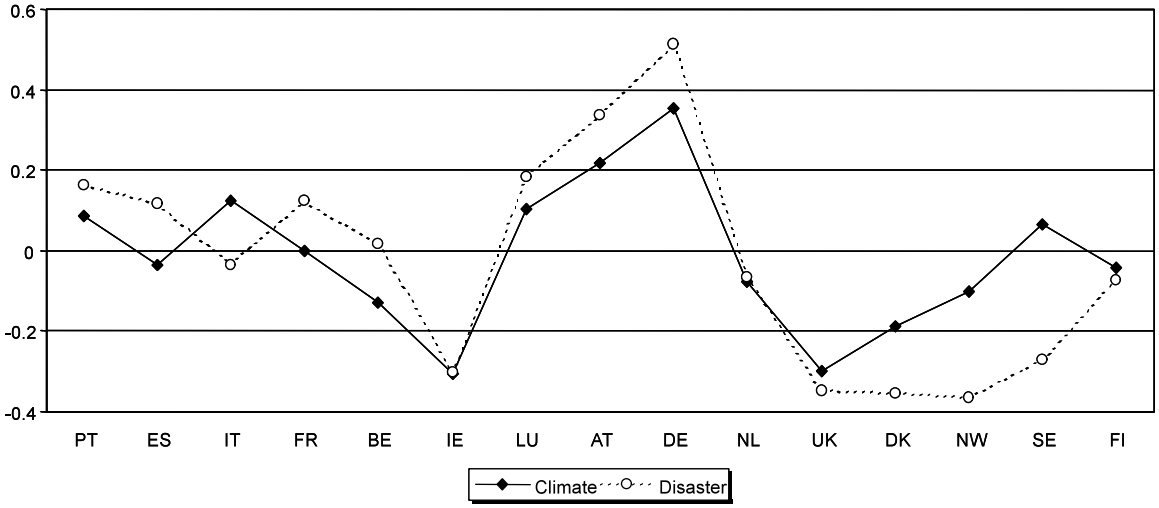

Figure 5. Mean levels[1]) of worry about climate change and natural disasters per country.

[1]) Standardized residuals (overall M= 0, SD = 1) of degree of worry about climate change and natural disasters, given people's level of worry about water pollution, hazardous activities and local issues.

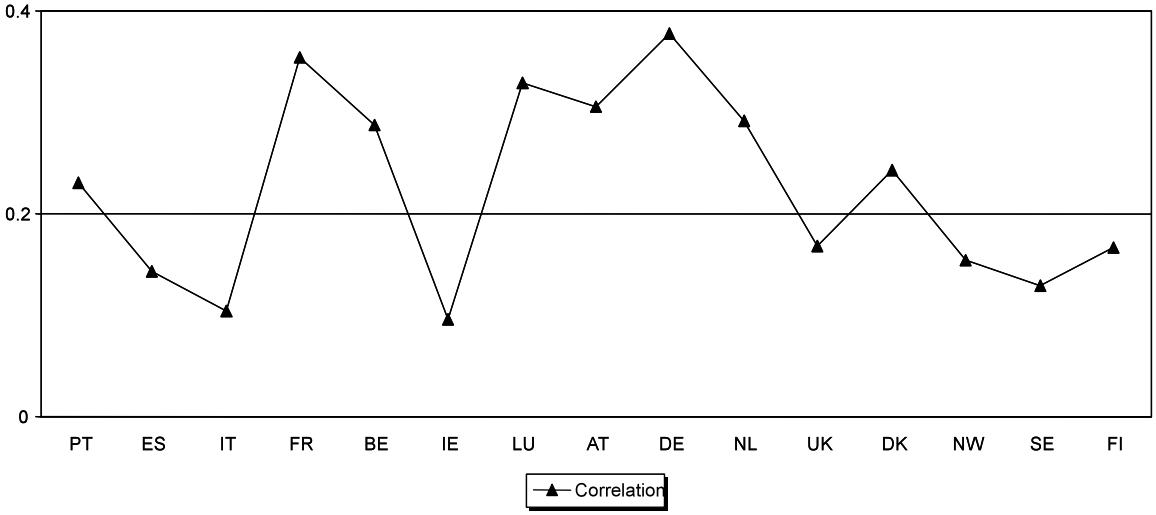

Figure 6. Partial correlations between worry about climate change and about natural disasters, given people's level of worry about water pollution, hazardous activities and local issues.

Linkages between climate change and energy issues were analysed on the basis of Eurobarometer 57. Many people in Western Europe agreed with the statement about the significant contribution of the use of fossil fuels (coal, oil, gas etc.) to global warming. This connection was confirmed by more than 80% of the citizens in five of the countries (Figure 7). Although this indicates at least some general understanding of the issue, it should be added that there were also associations that indicate confusion. For instance, many citizens had the opinion that nuclear power also contributes to global warming (Figure 8). Explicit denial of this impact was higher in countries in the north where the average level of education is higher, but in these countries as well a large percentage agreed (overall, the correlation between length of education and agreement–disagreement with this item is r = .17 (n = 15036)).

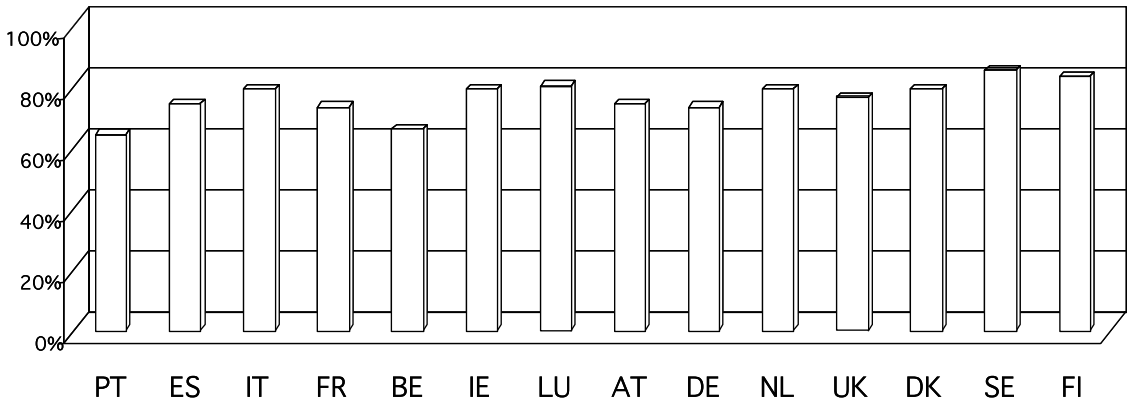

Figure 7. Percentage per country that agreed with the statement: 'The use of fossil fuels (coal, oil, gas etc.) contributes significantly to global warming and climate change'.

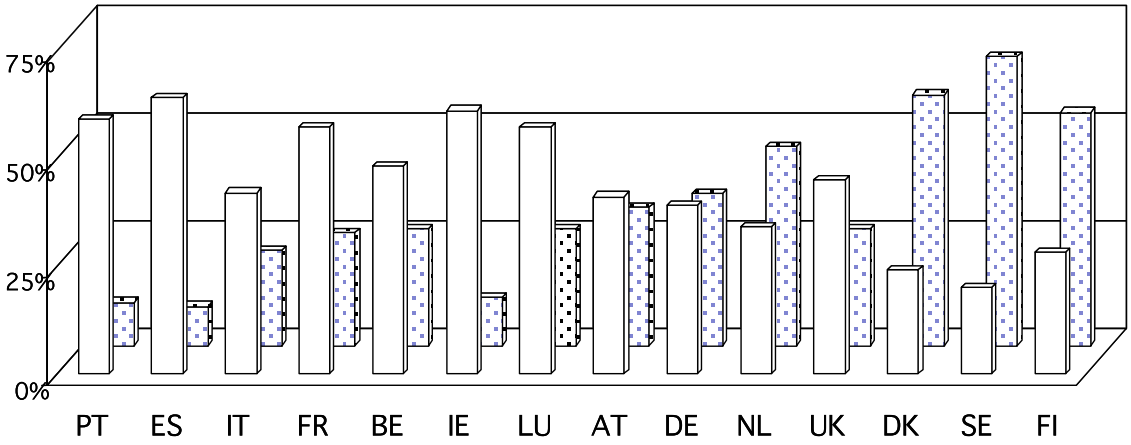

Figure 8. Percentage per country that agreed (front row) or disagreed (back row) with the statement: 'Nuclear power contributes significantly to global warming and climate change.'

These results underline the conclusion of public opinion researchers that many citizens of the European Union had only vague ideas about the energy situation (European Commission, 2003). For example, the same data set revealed that Europeans gave high priority to renewable energy sources (conventional and new) and that they tended to overestimate the actual use of renewable energy sources in their country. This was particularly salient in the Netherlands where 23% gave the answer that renewable energy sources are used 'much' to produce energy in this country. Accordingly, many citizens had no idea about the steps that still have to be taken to make 'renewables' a more than marginal source of energy. These outcomes demonstrate that the common-effect model needed for thinking about a climate-proof country will not be easy to communicate.

4. Conclusions

Although far more research is necessary, the secondary analysis of the European surveys has produced valuable insights into climate-relevant information processing. Climate change was often framed in a way that articulates its associations with rain- and river-based problems. This indicates that the notion of climate change may be relatively easy to grasp if it is conceived as a common cause of various changes in nature. Policy-makers may need such an approach to increase public awareness of the issue. In contrast, many citizens of Western Europe had only vague ideas about the energy situation in their country. This illustrates that climate-proofing will involve a different mental model. It will require hard thinking to consider all the measures necessary to produce a climate-proof country. Paying attention to the distinction between a common-cause and a common-effect model may be of help in this context.

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References

Ahn, W. K., Kalish, C., Gelman, S. A., Medin, D. L., Luhmann, C., Atran, S. et al. (2001) 'Why Essences are Essential in the Psychology of Concepts,' *Cognition* 82: 59-69.

Bord, R. J., Fisher, A. and O'Connor, R. E. (1998) 'Public Perceptions of Global Warming: United States and International Perspectives,' *Climate Research* 11: 75-84.

Bostrom, A., Morgan, M. G., Fischhoff, B. and Read, D. (1994) 'What Do People Know about Global Climate Change? 1. Mental Models,' *Risk Analysis* 14: 959-70.

Chong, D. and Druckman, J. N. (2007) 'Framing Theory,' *Annual Review of Political Science* 10: 103-126.

Di Nocera, F., Couyoumdjian, A. and Ferlazzo, F. (2006) 'Crossing the Pillars of Hercules: The Role of Spatial Frames of Reference in Error Making,' *Quarterly Journal of Experimental Psychology* 59: 204-21.

European Commission (2002) *Eurobarometer 58.0: The Attitudes of Europeans Towards the Environment*. Brussels: European Commission, Directorate-General Environment.

European Commission (2003) *Eurobarometer. Energy: Issues, Options and Technologies*. Luxembourg: Office for Official Publications of the European Communities.

Glacken, C. J. (1967) *Traces on the Rhodian Shore: Nature and Culture in Western Thought from Ancient Times to the End of the 18th century*. Berkeley, CA: University of California Press.

Greif, M. L., Nelson, D. G. K., Keil, F. C. and Gutierrez, F. (2006) 'What do Children Want to Know about Animals and Artifacts? Domain-specific Requests for Information,' *Psychological Science* 17: 455-59.

Kabat, P., van Vierssen, W., Veraart, J., Vellinga, P. and Aerts, J. (2005) 'Climate Proofing the Netherlands,' *Nature* 438: 283-84.

Keil, F. C. (2006) 'Explanation and Understanding,' *Annual Review of Psychology* 57: 227-54.

Kempton, W., Boster, J. S. and Hartley, J. A. (1995) *Environmental Values in American Culture*. Cambridge, Mass.: MIT Press.

Scheuch, E. K. (1989) 'Theoretical Implications of Comparative Survey-research - Why the Wheel of Cross-cultural Methodology Keeps on Being Reinvented,' *International Sociology* 4: 147-67.

Schön, D. A. and Rein, M. (1994) *Frame Reflection: Toward the Resolution of Intractable Policy Controversies*. New York: Basic Books.

SPSS (2003) Release 12.0. Chicago, Il: SPSS Inc.

van Herk, H., Poortinga, Y. H. and Verhallen, T. M. M. (2004) 'Response Styles in Rating Scales - Evidence of Method Bias in Data from Six EU Countries,' *Journal of Cross-Cultural Psychology* 35: 346-60.

Author information

Joop de Boer is senior researcher at the Institute for Environmental Studies, VU University Amsterdam. He has a doctor's degree in psychology from the University of Amsterdam. His current research focuses on the relationship between environment and behaviour, frames, risk perception, value priorities and decision-making.

Contact address:

Institute for Environmental Studies, VU University Amsterdam, De Boelelaan 1087, 1081 HV Amsterdam, The Netherlands

Email: joop.de.boer@ ivm.falw.vu.nl

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8

Communicating climate change in Portugal:
A critical analysis of journalism and beyond

Anabela Carvalho and Eulália Pereira

Abstract

This chapter analyses discourses circulating in the Portuguese public sphere(s) about climate change, and discusses the problems associated with representations of the issue in the press and television news. Understandings of risk and responsibility are given particular emphasis given their importance for problem definition and proposed courses of action. The study covers four print media: *Correio da Manhã* (a popular daily newspaper), *Expresso* (a quality weekly newspaper), *Público* (a quality daily newspaper) and *Visão* (a mid-market weekly news magazine). Various aspects of press coverage since 1990 are examined but we focus in more detail on four 'critical moments' between 2003 and 2007. A sample of recent television news from RTP1, 2: (both part of the public broadcasting company), SIC and TVI (private channels) is also analysed. Besides journalistic discourse, we look at some aspects of the communication of climate change by politicians, non-governmental organizations and other social actors, and how it relates to media discourses.

Keywords: climate change, Portugal, media, social actors, discourse

1. Introduction

In the context of Europe, Portugal is in a rather specific situation as it was allowed to increase its greenhouse gas (GHG) emissions by 27% from 1990 levels in the period 2008-2012 within the European Union's burden-sharing policy with regard to the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC). In 2008 (UNFCCC, 2008) and in fact already several years earlier, the country had exceeded this target by a significant margin, mainly due to increases in road transportation. This is a path that has been followed in many countries that are in a process of rapid economic transformation. Hence, analysing communication on climate change in Portugal not only sheds light on a social and cultural context where than has been much less research than in northern Europe and the USA as it may also provide hints to analogous realities.

Survey studies (Dunlap, 1998; Nave & Schmidt, 2002) indicate that, amongst the Portuguese population, there is a high level of concern and a relatively poor understanding of climate change, as well as little behavioural change towards mitigation of GHG emissions. The media play an important role in providing information and raising awareness about the issue (e.g. Wilson, 1995). The imagery produced and circulated in the media is likely to impact on social representations although processes of interpretation are rooted in particular lived experiences and social contexts (cf. Carvalho and Burgess, 2005). In turn, the media constantly draw on the discursive and social practices of individuals and institutions. The social construction of such a complex and multifaceted issue as climate change is closely tied to the pronouncements of a variety of social actors, such as politicians, scientists, corporations and environmental organizations.

This chapter is part of a wider project that aims to understand the links between the discourse of social actors, the discourse of the media and social representations on climate change in Portugal. The goals of the chapter are as follows. Firstly, we aim to identify the main meanings of climate change in the discourse of a variety of social actors (policy institutions, scientists, non-governmental organizations, corporations, etc). Secondly, we aim to analyse the media's discursive (re)construction of climate change and understand what the dominant discourses are; the relation between the discourses that are produced and circulated by social actors and the media discourse is one of the aspects to be considered.

Climate change has many other dimensions but this chapter is mainly concerned with two aspects that are central to discursive and social practices: problem definition and proposed course(s) of action. Therefore, representations of the risk associated with climate change, which are grounded on knowledge as well as on social values, and discursive constructions of responsibility for preferred action plans are the main focuses.

2. Research context

Media attention to climate change has fluctuated significantly since the 1980s but in many countries there has been a markedly high volume of coverage in the last decade (cf. Boykoff and Roberts, 2007). In the same period, research interest in the roles of the media has grown considerably with scholars examining such aspects as the role of journalistic norms in media coverage of climate change (e.g. Boykoff and Boykoff, 2007), ideological filters in the representation of knowledge (Carvalho, 2007b), the activities of climate change 'sceptics' and their impact in the media (McRight and Dunlap, 2000), the influence of different forms of science reporting in perceptions (Corbett and Durfee, 2004) and narrative cycles in climate change news (McCommas and Shanahan, 1999).

With its various space and time scales, non-linear cause-effect links, unclear manifestations, and multiple sources of responsibility, climate change is, in some respects, at odds with the

prevailing media quest for 'facticity' or the search for answers to the questions 'who, what, when, where, how and why'. Amongst the factors that may contribute to placing the issue on the media agenda, the most important one is likely to be the agency of a number of social actors in talking about it. Multiple voices have 'spoken for' climate change in the last two decades. The scientific community first created the social problematicity of climate change insofar as it gathered, interpreted and presented data that suggested a connection between concentrations of GHGs in the atmosphere, global mean temperatures and human sources of GHGs emissions. The political process that ensued included a number of high-level international summits, institutions and legal frameworks, and engaged a variety of policy-makers, interest groups and environmental organizations. Despite the increasing consensus amongst scientists regarding the anthropogenic nature of the problem and its gravity, climate change has been contested in its scientific, political, economic and other dimensions. The media are a crucial arena in the negotiation of different understandings of the issue and in the production, reproduction and transformation of meanings of climate change. Studies about the US and the UK have shown the power of politicians in setting the media agenda and structuring the discourse (Trumbo, 1996; Carvalho, 2005).

Whereas climate change may present difficulties as a potential news topic, some features make it attractive for media professionals. That is especially the case for the superlative nature of potential impacts: the range and reach of such impacts, which go beyond anything previously experienced, the number of affected people, the extent of damage that it may cause and the sheer potential for disruption of life-as-we-know-it. This high level of risk has motivated some hyped depictions of the problem and messages dominated by catastrophism. Weingart, Engels and Pansegrau (2000) suggested that this Pandora box view of climate change was prevalent in the German media since the mid-1980s. In the case of the UK, recent studies have pointed out the presence of alarmism in the press. Ereaut and Segnit (2006) concluded that representations of climate change fall into two main types of 'linguistic repertoires'[1]: *alarmist* and *optimistic*. The first conveys an image of climate change 'as as awesome, terrible, immense and beyond human control. (…) It is typified by an inflated or extreme lexicon, incorporating an urgent tone and cinematic codes. It employs a quasi-religious register of death and doom, and it uses language of acceleration and irreversibility.' (2006: 7). The optimistic repertoires suggest that things 'will be alright' (p. 12) and include the following forms: 'settlerdom', 'British comic nihilism', 'rhetorical scepticism', 'expert climate change denial', 'warming is good' and 'free market protection'. The *pragmatic optimistic* repertoires are a variation that suggests that 'it'll be alright if we do something' (ibid.). 'Establishment techno-optimism', 'non-establishment techno-

[1] Linguistic repertoires are 'systems of language that are routinely used for describing and evaluating actions, events and people. A repertoire might include a distinctive lexicon, a set of grammatical or stylistic features, or particular images, metaphors, idioms, stories and categories.' (Ereaut and Segnit, 2006: 12).

optimism', 'David and Goliath', 'corporate small actions' and 'personal small actions' are its sub-types.

Ereaut and Segnit argue that the *alarmist* repertoire raises difficulties for acting upon climate change as it constructs it as being too big for individuals to tackle. Citizen agency is nullified in face of the scale of the problem. Therefore, the authors argue, this 'contains an implicit counsel of despair' (p. 14). Several researchers have recently argued that climate change communication that focuses on catastrophe and fear is often counterproductive as it leads to disbelief and apathy or to paralysis. A report produced by UNEP/Futerra (2005: 13) has suggested that a ''fear' message' is unlikely to engage people. Moser and Dilling (2007) have also argued that fear-inducing communication on climate change can generate reactions of denial and rejection of the problem.

In a more general diagnosis of mediations of climate change, Ereaut and Segnit (2006: 7) conclude that 'in the British mainstream media today, the climate change discourse looks confusing, contradictory and chaotic.' This fits in with Defra's (2006: 7) evaluation of survey results: most people in the UK think that climate change 'is confusing – they can't see how it relates to them; won't affect them personally; is a problem for the future, not now; and can't be affected by their individual actions, because the problem is so big'.

Research conducted in Portugal (Cabecinhas, Lázaro and Carvalho, this volume) also indicates that despite widespread concern and perceptions of risk people are ambivalent about solutions for climate change. The roles and responsibilities that people assign to different social actors, including themselves, and their views about the possible paths to pursue in dealing with climate change are both an individual and a social construct. Communication practices are key to these intersubjective negotiations of meaning: How are we to address the environmental crisis? What kind of measures should be put in place? What is to be expected from different agents?

Dryzek's (1997) analysis is a useful contribution to map understandings of the 'politics of the Earth'. Viewing discourse as 'a shared way of apprehending the world' (1997: 8), Dryzek argues that four elements are central to all environmental discourses: (1) basic entities whose existence is recognized or constructed; (2) assumptions about natural relationships; (3) agents and their motives; and (4) key metaphors and other rhetorical devices (p. 15-18). By looking at the specificities of different narratives about humans' relation with the environment, he identifies nine discourses. Emerging in the 1970s, the idea of finite resources and limits to growth led to *survivalism*, a discourse that was denied by *prometheanism*, the belief that humans can, like Prometheus, achieve progress and growth without boundaries. Beyond these two fundamentally different views, Dryzek organizes environmental discourses into three groups: reformist problem-solving discourses, sustainability discourses and radical discourses. The first group includes *administrative rationalism*, which constitutes the state and technical expertise into the

principal environmental problem-solvers, *democratic pragmatism*, which believes in the mobilization of citizens and social groups to shape policy-making, and *economic rationalism*, that privileges market forces in addressing environmental problems. Sustainability discourses encompass two types: *sustainable development* and *ecological modernization*. Both discourses attempt to integrate environmental protection, economic growth and social justice, as well as safeguard the rights of future generations. *Ecological modernization* complements that with the idea that green policies and green technology can generate wealth. Finally, Dryzek points out two discourses that require radical shifts in the ways of dealing with the environment: *green romanticism* and *green rationalism*. While the former calls for a change in human consciousness, the latter suggests that environmental problems will only be solved by structural transformation and fundamentally different politics.

In this chapter, the works of Ereaut and Segnit (2006) and Dryzek (1997) will be guiding references in the analysis of discursive constructions of risk and responsibility respectively, even though our analytical framework is broader and includes other features of discourse.

3. Discursive constructions of climate change in Portugal

In this part, we will analyse public discourses on climate change in Portugal starting with the communication of various social actors and later moving on to the media's reconstruction of the meanings of the issue.

3.1. Social actors' communication on climate change

As argued above, the interpretations of climate change advanced by various social actors define the debates that take place in societies. Some of those interpretations are likely to have a significant impact on media discourses. Our research was guided by the following questions: Which discourses on climate change are 'out there' in the Portuguese 'public sphere'? Who speaks for this problem? What visions do different actors advance regarding climate change?

In order to look for answers to these questions, we mainly focused on materials available in the Internet. Although not 'universal' in many ways, the Internet can be considered a showcase for the diversity of discourses that are put forth in modern societies, and, in many cases, it works as a relatively encompassing archive of documents. In the first six months of 2006, we conducted several searches of the Internet with the following keywords: 'alterações climáticas' [climate change] or 'aquecimento global' [global warming] or 'efeito de estufa' [greenhouse effect] or 'Protocolo de Quioto' [Kyoto Protocol]. We thereby collected all available online documents of a wide range of policy and science-related institutions, non-

governmental organizations (NGOs), corporations and other social actors[2]. Governmental programs, parliamentary speeches, NGO reports and campaign materials are some of the resulting materials. The following table presents the volume of collected data for each category of social actor.

Table 1. Number of documents on climate change found in the Internet for each type of social actor.

Type of social actor	Number of documents
Environmental NGOs	100
Government	78
Interest groups/Professional associations	30
Corporations	23
Universities/Research units	21
Local government	7
Others	19
Total	278

Table 1 shows that environmental NGOs have produced the highest number of documents on climate change available in the Internet. Although not entirely surprising, this is worthy of note. It should be emphasised that Quercus, the environmental NGO that intervenes publicly the most in Portugal, was responsible for around 90% of these documents, most of which are 'comunicados' (communiqués/press releases[3]) dating from 1999 to 2006. Taking into account the foundational role of science for understanding climate change one could expect a higher number of articles from universities and research units. This may reflect both the relatively small number of Portuguese research projects on climate change and the non-proactive communication strategies of scientists. By distinguishing the central government from the local government, we aimed to shed light on local policies focusing on climate change. The low number of documents suggests that the issue is not viewed as a (communicative) priority.

As a multifaceted and complex issue, climate change can be discursively constructed from different perspectives or angles. Knowing which are the macro-themes privileged by different social actors in their communication about climate change can not only reveal preferences and agendas but also help make inferences about the impacts of discourse in perceptions of climate change. To this purpose, we carried out a content analysis of all the documents. Based on initial assumptions and further confirmation by the analysis, we can state that the

[2] Obviously, all the results of the keyword search that concerned other Portuguese-speaking countries were excluded.
[3] The term 'comunicado' means both communiqué and press release in Portuguese.

most important macro-themes in climate change discourses are ‘science’, ‘economics’ and ‘politics & regulation’. These correspond to key aspects of the social emergence and management of this issue.

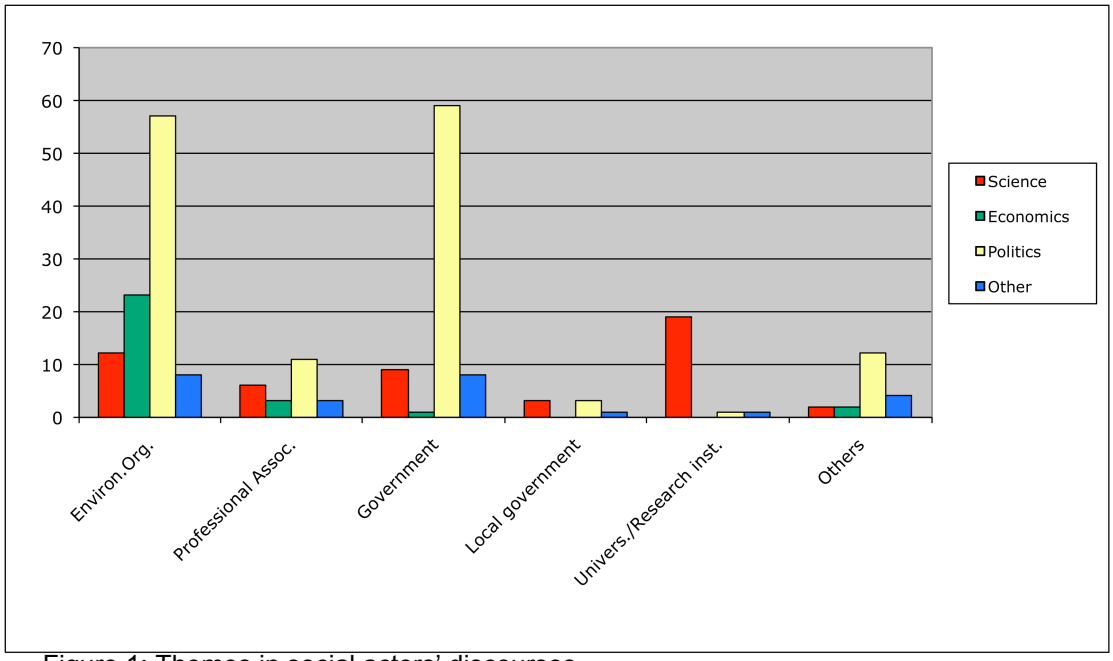

Figure 1: Themes in social actors’ discourses.

The method we employed consisted in determining what the dominant theme in each document was. Although loosing sight of other themes present in a text, we produced a simple but effective summary of the most important angles through which climate change is socially constructed. Figure 1 shows a clear prominence of the theme ‘politics & regulation’ in the discourse of most actors. As climate change has increasingly become a matter of policy management, a variety of social actors make regular pronouncements about regulatory options and measures. It is also telling that the economic dimension of the issue has almost the same number of occurrences as the scientific one, and that it corresponds to nearly half as many documents of environmental NGOs as politics & regulation.

A finer analysis of social actors’ communication on climate change was pursued through Critical Discourse Analysis (cf. Carvalho, 2008). The following aspects were taken in consideration: themes or objects of discourse (which aspect or angle of climate change was privileged); actors (which social actors were present in the texts and what were their roles); structure – or layout – of the text (e.g. what was chosen for the title and first paragraph) and lexical choices and rhetoric (e.g. metaphors). We also examined the discursive strategies of the various social actors (i.e., how they constructed reality in discourse towards a certain effect or goal) and attempted to detect values, preferences and worldviews or, more generally,

ideologies. Critical Discourse Analysis was helpful towards identifying types of discourse, according to Dryzek's (1997) classification, as well as Ereaut and Segnit's (2006) 'linguistic repertoires'.

The Portuguese government pronouncements on climate change tend to fit into one or more of three of Dryzek's categories: *administrative rationalism*, *economic rationalism* and a neo-liberal version of *economic modernization*. The following excerpt of the **'**Communication of the Council of Ministers from 10 May 2001' at the occasion of approval of the National Strategy on Climate Change offers insights into the government's position:

> 'the Portuguese state is determined to honour its international commitments and ... takes up the role of regulating agent for the actions that different sectors of [economic] activity and citizens ought to undertake, keeping in mind that it is important to minimize possible negative impacts on society as a whole' (Conselho de Ministros, 2001).

Here, action on climate change is constructed as a commitment external to the country ('international commitments'). The government uses a strategy of self-positioning as (passive) regulator of the actions of others. Whereas it makes no attempts to discursively engage society in mitigating climate change, it emphasises that society's well-being should not to be affected by actions to that purpose, thereby associating potentially negative impacts to such actions. There are aspects of *administrative rationalism* and mainly of *economic rationalism* in this discourse.

In the spring of 2003, two pronouncements related to energy policy are worth mentioning. On 13 March 2003, the government presented the 'Guidelines of the Portuguese Energy Policy' and on 3 April 2003 it publicly communicated decisions towards the liberalization of the energy market (merge of electricity and gas utilities; selling part of the state ownership). 'Market liberalisation' was presented as the first goal (Conselho de Ministros, 2003) and 'benefits for the consumer' (namely, lower energy prices) were highlighted (Ministério das Finanças/Ministério da Economia, 2003). The government argued that its decisions would reinforce the position of the Portuguese energy sector and improve the competitiveness of national companies (Conselho de Ministros, 2003). The Government Energy Policy was said to be structured into 'three strategic axes': 'to guarantee the security of supply; to promote sustainable development; to stimulate national competitiveness.' (ibid.) In a typically *economic rationalism* fashion, the withdrawal of the state from energy economics is here presented as desirable and the government construed as a facilitator of the free market.

The public presentation of the legal 'package' entitled 'Winning in the carbon economy' on 20 January 2005 provided the context for the government to put forth ideas that are clearly associated with an *ecological modernization* discourse. Climate change was presented as an opportunity to turn Portugal into a 'winner in the carbon economy' (Ministério do Ambiente e

do Ordenamento do Território, 2005). In other words, one could say that nature's degradation appears as a chance to make money.

Most of the documents available in the sites of official bodies are of a relatively technical nature and are written in a language that would be somewhat opaque for most lay people. Climate change tends to be constituted into a techno-managerial issue by the state, something that presumably does not contribute to engage citizens with the problem (cf. Carvalho, 2007a).

As mentioned above, amongst environmental NGOs, Quercus produced the vast majority of documents on climate change available in the Internet. Most other NGOs do not make regular pronouncements on the issue. Quercus does not propose radical social changes to address climate change. It tends to adopt a discourse that crosses *administrative rationalism* with *environmental modernization*. An analysis of its 'comunicados' reveals that its main addressee is the government, from whom it normally calls for stricter limits on emissions or better implementation of policy. It often denounces faults in the government's performance and recommends certain courses of action. Its promotion of political regulations, for instance through the introduction of a carbon tax applied to all uses of energy, suggests a discourse of *administrative rationalism*. Moreover, Quercus endorses the power of intergovernmental organizations and international law to reduce GHG emissions. The European Commission, for instance, is often mentioned in Quercus' discourse. It is normally constructed as a reference in terms of environmental policy-making for putting pressure on the national government. For example, a joint communication of Quercus and four other environmental NGOs on 1 April 2004 pointed out that, since the Portuguese Plan for Allocation of Emission Allowances 2005/2007 did not mean any reduction in projected emissions and gave signs to the market that were contrary to the need for energy efficiency, the NGOs were left with no alternative but to submit a complaint to the European Commission against the Portuguese government (GAIA/GEOTA/LPN/Quercus/CPADA, 2004). The title of the document, 'Climate change: Portuguese plan gives Licence to Emit', made an analogy with a 007 movie's title, a telling rhetorical device. Elsewhere, Quercus maintained that emissions reductions should not be seen 'not as a mere obligation but mainly as an opportunity to turn our economy more efficient and therefore more competitive' (Quercus, 2003), a view that is typical of *ecological modernization*. Nevertheless, Quercus' analysis of Portugal's performance is not optimistic; e.g., it stated on 31 January 2006 that the revised Portuguese Plan on Climate Change showed the 'incapacity' of Portugal to implement measures towards meeting its Kyoto obligations and had 'lost credibility' (Quercus, 2006).

Our analysis suggests that, at the time of our search at least, Portuguese research on climate change had a relatively low salience/visibility in the websites of research institutions. The one important exception to this is the Scenarios, Impacts and Adaptation Measures project (SIAM, 2006), led by Filipe Duarte Santos, from the University of Lisbon. It had a

website with a number of documents available for downloading and was referred in other websites on scientific research and events. It should be pointed out that we found an interdiscursivity gap regarding Portuguese research on climate change: it is almost completely absent from documents of other social actors. For reasons of space we will not be able to go into detail in the analysis of the communication of other social actors here. We will simply note that in Portugal, unlike other countries, business and other private interest organizations do not normally deny the problematicity of climate change nor its anthropogenic origin.

In terms of Ereaut and Segnit's (2006) analysis, the discourse of social actors is dominated by a mildly optimistic outlook, except for environmental NGOs. While the government expects climate change to be addressed through regulation and economic measures, most other actors clearly avoid a dramatic discourse. There are very few references to the risks associated with climate change in the documents of Portuguese social actors available in the Internet. Scientists, for instance, occasionally appear to be over-cautious in communicating the potential impacts of climate change. NGOs do not convey a fatalistic reading of climate change but make a negative evaluation of the government's performance.

3.2. Journalistic discourses on risk and responsibility

The media are both an arena where the discourse of other social actors gets amplified and a key social actor in the production and reproduction of the meanings of climate change. Our analysis focuses on three newspapers, a news magazine and four television channels. The print media that we analysed have some of the highest circulations in Portugal and are representative of a wide range of market segments and ideological tendencies: *Correio da Manhã* (a popular daily newspaper), *Expresso* (a quality weekly newspaper), *Público* (a quality daily newspaper) and *Visão* (a mid-market weekly news magazine). We searched for relevant texts in *Correio da Manhã*, *Expresso* and *Visão* by using their web-based archives. The search keywords were the same as in the searches for documents by other social actors: 'alterações climáticas' [climate change] or 'aquecimento global' [global warming] or 'efeito de estufa' [greenhouse effect] or 'Protocolo de Quioto' [Kyoto Protocol]. Difficulties of access to *Público*'s archive in some of the periods led to a careful manual search of the printed issues of this newspaper. We are confident that this has not significantly altered results. Given the importance of graphic aspects in *Visão*, the only news magazine in our sample, we decided to complement the website search with copies of the printed issues.

The analysis in this chapter focuses on four 'critical moments' between 2003 and 2007, which are (or can be perceived to be) linked to climate change in diverse ways. These are periods when events with the potential to stir up debate and reshape the meanings of the issue took place: a heatwave that occurred between 29 July and 15 August 2003; the public presentation of the Portuguese Plan for Allocation of Emission Allowances 2005/2007 ('Plano

Nacional de Atribuição de Licenças de Emissão' – PNALE) on 17 March 2004; the Kyoto Protocol's entry into force on 16 February 2005; and the publication of the Summary for Policymakers (SPM) of the 4th Assessment Report (AR) by the Intergovernmental Panel on Climate Change (IPCC) (on the 'Physical Science Basis') on 2 February 2007, at the 10th Session of the Working Group I in Paris[4]. With these choices, we attempted to have a mixture of different moments/events of national and international relevance.

Before we move on to the analysis of those critical moments, we will provide an overview of the volume of coverage in the four print media since 1990, when the issue first gained some public visibility in Portugal, in connection with the publication of the 1st IPCC AR. Our option has been to look at a number of critical moments: the Earth summit in Rio de Janeiro in 1992; the 1st Conference of the Parties (COP1) to the UNFCCC in 1995; the 2nd IPCC AR published in 1996; the Kyoto summit of 1997 (COP3); the 3rd IPCC AR in 2001; the publication of the Portuguese National Plan on Climate Change (PNAC) in 2001; and, more recently, the four moments described above plus the occurrence of the Katrina hurricane in the US in 2005.

Figures 2 and 3 indicate that there have been significant fluctuations throughout the years, particularly in the quality press. While previous science reports did not generate much media interest (with the exception of the 3rd IPCC report in *Expresso*), the 4th IPCC AR marked a clear 'boom' in media attention. The conjunction of the AR with the publication of Al Gore's book and movie, as well as the Stern report, may have led to a more receptive (if not avid) media attitude towards reporting on climate change knowledge. The international political summits that are generally perceived as most iconic, such as Rio's and Kyoto's, clearly led to an enhanced media interest while key national events, such as the publication of PNAC and PNALE, motivated very few articles. Contrary to possible expectations, extreme weather events were not very frequently associated with climate change, especially in the popular press. Finally, the differences in the volume of media coverage in the quality and the popular press are noteworthy: the former consistently dedicated a lot more space to climate change than the latter.

[4] In order to be sure of including articles that may have been published in anticipation of a given event and those that may have been written in reaction to it, our search covered 14 days before and 14 days after the event. The periods under examination are therefore the following: 29 July-29 August 2003 (in the case of the heatwave, an unpredictable event, the search started at its outset and not two weeks before); 3-31 March 2004; 2 February-2 March 2005; and 16 January-16 February 2007.

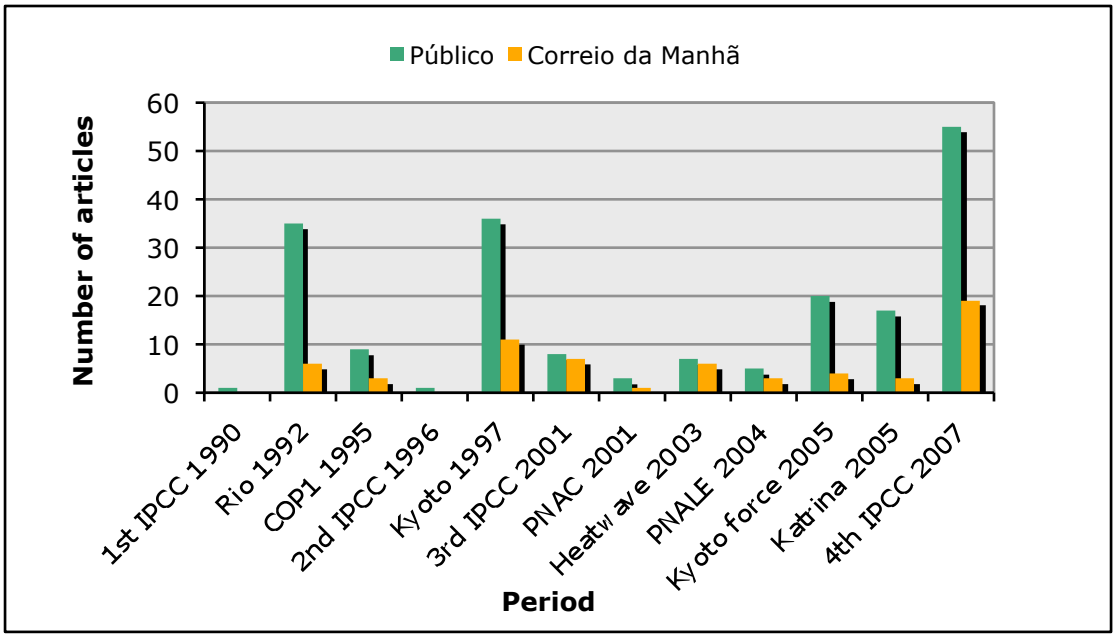

Figure 2. Number of articles on climate change in *Correio da Manhã* and *Público*, 1990-2007.

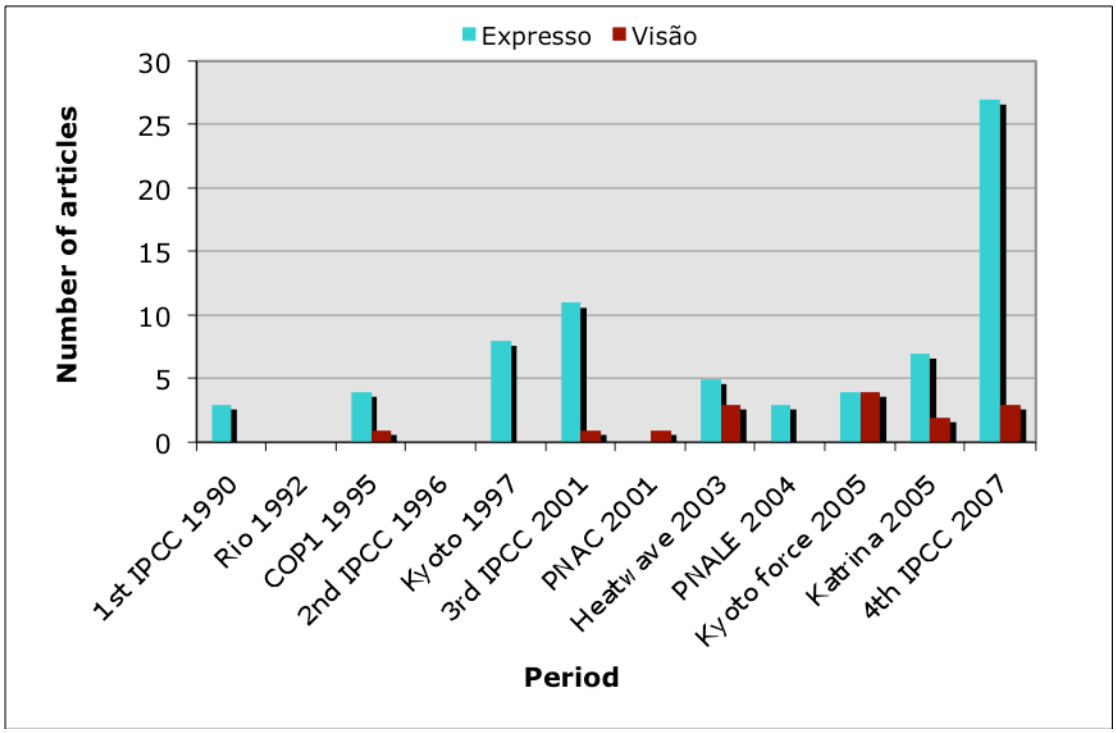

Figure 3. Number of articles on climate change in *Expresso* and *Visão,* 1990-2007.

In the four critical moments that are the focus of this chapter, we examined press articles of every genre: news pieces, editorial notes, opinion articles, etc. We analysed all the articles on climate change published in those periods but will focus here on the articles that refer – or are related – to the event or issue that was considered critical. The Critical Discourse Analysis method described in the previous section was also employed for the press articles. Besides examining the individual articles we undertook a comparative analysis of the discourse of the various print media, which provided insights into the alternative ways of representing reality.

a) Reporting on the 2003 heatwave

One of the most severe heatwaves ever registered in Europe took place in August 2003. It affected a number of countries with a death toll in excess of 30000 people (over 2000 in Portugal) (UNEP, s/d). The heat contributed to widespread forest fires totalling an area of 425000 hectares in Portugal.

In a piece from 10 August 2003, *Correio da Manhã* suggested that there could be a link between the heatwave and global climate change. It interviewed several scientists but did not appear to 'force the evidence', sticking instead to words such as '[the heatwave] may be a signal that climate change is taking place' (Ramos, 2003c), as uttered by scientists. However, the search for confirmation of the above-mentioned link led to the question also being posed to the Secretary of State for the Environment: 'Do you think that there are signs of climate change already?'. He gave a much more assertive answer than researchers: 'Yes. In fact, (…) the heatwave (…) is completely abnormal. It may be a clear sign that human-induced global warming may be happening faster and more strongly than [what the IPCC forecasts]' (Ramos, 2003b).

Visão quoted Filipe Duarte Santos and Carlos da Câmara, the vice-president of the Meteorology Institute, to suggest a causal relation with the greenhouse effect (Sá, 2003). Even though the scientists' words that were cited did not actually attribute the heatwave to climate change, the selected quotes and their juxtaposition implied that the two factors were connected. This news magazine printed a long piece on the impacts of the heat on people's lives that included their names, personal stories and coping strategies, such as jumping into the river with the clothes on (Oliveira, Ruela and Sá, 2003). Such portraits of social reality are part of an empathy-inducing strategy commonly used by the popular press. Whereas this has commercial purposes, it also has significant social effects some being arguably of a disciplinary nature (e.g. accommodation to suffering as others suffer too). A text box associated with this article carried an alarmist message. Under the headline 'Bleak future', it read: 'the last 15 days (…) may have been a warning: the end of this century will be an amplified version of this choke. In the

scenarios of the SIAM project (…), heatwaves may last up to 20 consecutives days by the coast and two months in the interior regions of the south. (…) Save yourself whoever can.'

The popular press is often accused of excessive simplifications, exaggerations and distortions of scientific knowledge. A more complex picture emerged in our analysis. Both *Correio da Manhã* and *Visão* appealed to scientific authority as they quoted several scientists; in fact, more than *Expresso* did in this period. In one article, *Correio da Manhã* spoke of 'different models of simulation of the evolution of climate' (Ramos, 2003a), thereby acknowledging the non-unicity of knowledge. However, science was indeed distorted at times and errors were detectable, possibly contributing to public confusion about climate change. For instance, in several articles of *Visão* there was a mix-up between weather and climate: the headline of one article about the heatwave was 'Climate: Crazy heat' (Oliveira, Ruela and Sá, 2003)[5]. Discourse analysis suggested a different conclusion than the quantitative analysis regarding the link between the heatwave and climate change in these media.

In one of its articles on the heatwave, *Público* offered an overview of knowledge on climate change in a restrained language close to science's pointing out that scientists 'avoid jumping to the conclusion that what is happening is irrefutable proof of climate change'. While the headline clearly stated that 'Heatwave does not prove global warming' (*Público*, unattributed, 2003), the likelihood of similar events becoming more frequent was emphasized in the caption of a picture of youngsters cooling off in a fountain: 'What we are witnessing is a sample of what is in the store for the planet in a scenario of climate change'. The association between the heatwave and the scenarios of the SIAM project was also made elsewhere (Garcia, 2003).

Expresso established a link between the heatwave and global climate change with a large degree of certainty: 'The abnormal heat is already a consequence of climate change felt throughout the planet' (*Expresso*, unattributed, 2003a). Yet, in other articles it referred to climate change as an (uncertain) 'theory' (*Expresso*, unattributed, 2003b) and spoke uncritically of its impacts as potentially positive for access to resources: 'research also reveals a positive aspect in the disappearance of the ice [in the Arctic]. Norway and Russia believe that it may be a promising region for exploration of oil and gas, which will become easier' (ibid.).

This critical moment had all the ingredients to potentially induce an alarmist reading of climate change: extreme heat, widespread forest fires and a very high number of heat-related deaths. However, there was no (direct) association between the rise in mortality and climate change. More generally, even though there was one example of alarmism, we cannot state that the predominant depiction of those events was a fatalistic one.

In this period, there is little reflection on how to address climate change. Therefore, Dryzek's discourses do not quite apply, except for an article in *Correio da Manhã* on the possibility of a

[5] A similar confusion was also present in another article (Sá, 2003).

carbon tax where trust in regulatory measures is promoted through the voice of the Secretary of State for the Environment – a clear example of *administrative rationalism*.

b) Representing national responsibilities and the role of business

PNALE is critical because it determined the emission levels that the state allowed corporations to have for free (i.e. without purchasing emissions rights). Nevertheless, it generated a quite low level of media attention.

Correio da Manhã only carried one article on the subject, which brought up some aspects of *administrative rationalism* but gave priority to business competitiveness:

> '"Portugal will not go forwards alone with the introduction of ecotaxes", the Secretary of State for the Environment stated yesterday during the presentation of [PNALE]. José Eduardo Martins said that Portugal aims to meet Kyoto's objectives, but will not adopt measures that hurt the competitiveness of its companies.' (Ganhão, 2004)

The headline suggested sympathy for this political decision: 'Government stops ecotaxes'.

In *Público* there were two articles on PNALE. With the headline 'Government allows the increase of polluting emissions until 2008' (Garcia, 2004), one of them represented a quite different discourse relative to *Correio da Manhã*. It was a critical view of the government's permissiveness referring to the fact that emission allowances superseded industry's expectations, and a reminder that Portugal had already gone beyond its Kyoto target and needed to reduce its GHG emissions. It also included a reference to the critical reception of PNALE by environmental NGOs. The other article was headlined 'EDP claims that the plan has costs' (*Público*, unattributed, 2004). It conveyed the view of the public electricity company on the financial costs of implementing PNALE.

While one newspaper chose to highlight a view of national interest associated to business competitiveness and the free market, displaying a preference for values associated with Dryzek's *economic rationalism*, the other communicated a preference for stricter government regulations.

Expresso awarded the issue only a small note in the Economics section, which highlighted the 'bonus for emissions' (headline) at a time when Portugal was already 'slipping away' from Kyoto (*Expresso*, unattributed, 2004).

Visão did not publish any articles on PNALE.

c) Interpreting the Kyoto Protocol's entry into force

The entry into force of the Kyoto Protocol on 16 February 2005 was a potentially meaningful time for the media to raise questions such as: What is the significance of the Protocol? What are the challenges? What implications does it have for Portugal?

On 17 February 2005, *Correio da Manhã* reported on the criticisms made by the leaders of Bloco de Esquerda, a leftist party, of the environmental performance of some of the biggest Portuguese corporations (Gonçalves, 2005). This is a rare example of the media denouncing corporate responsibility. However, the article's headline 'Kyoto Protocol attacked in Setúbal' is misleading and inaccurate. It was the violation of the Protocol – and not the Protocol itself - that was attacked. In a piece highlighting the USA's withdrawal from the Kyoto Protocol, *Correio da Manhã* referred several times to GHGs as 'polluting gases' and to the countries that emit the highest levels of GHGs as the 'biggest polluters' (e.g. B.C.M., 2005). These lexical choices, which are also found in pieces from other sources (e.g. Ribeiro, 2005a) indicate that climate change is socially constructed in the context of the familiar (and quite vague) framework of 'pollution', something that may, in itself, have significant implications for public understanding of the issue (cf. Bickerstaff and Walker, 2001)

Visão's main piece on Kyoto, 'There it is!' (Ribeiro, 2005a), was written in a popular language style and punctuated by irony and sarcasm regarding the Protocol, its implementation and its impacts. Another piece, 'The weakest link' (Ribeiro, 2005b), criticized Portugal's environmental performance arguing that while the country was lagging behind in its obligations climate change was already having impacts there. These are examples of some scepticism regarding political responses to the problem. They represent the opposite of what Ereaut and Segnit (2006) called 'establishment optimism'.

Expresso also threw a critical look at the Portuguese situation à propos the Kyoto Protocol's entry into force. Using various voices, including several NGOs, an article headlined 'Kyoto not met' (Tomás, 2005) called into attention the fact that Portugal was seriously skidding away from emissions targets and that policy plans to reduce emissions needed to be urgently implemented. A similarly pessimistic tone could be found in *Expresso*'s *Única* supplement on 18 February 2005: 'It is very difficult to find signs of hope in environmental policies in Portugal' (*Expresso*, unattributed, 2005). In these approaches the state was to blame for the problems but it was also the one social actor that a variety of voices claimed that had to act. Contrastingly, a piece in the Economics section of the paper conveyed a techno-managerial perspective on carbon and the 'carbon economy'. It was all about earnings, costs, profits and companies (P.L., 2005).

On 16 February 2005, *Público* carried four articles on climate change and the Kyoto Protocol. The main article referred to the international politics of climate change and the difficulties on getting agreement on the Protocol (Fernandes and Garcia, 2005). A note recalling the tense days of COP-3 in 1997 when the Protocol was forged (Fernandes, 2005a) reinforced this idea while a piece with questions and answers offered a didactic summary of what was at stake (Fernandes, 2005c).

Ricardo Garcia (2005b) produced an overview of the implementation of the Portuguese plan on climate change. Looking at a number of sectors, from transport policies to sources of energy, from forestry to energy efficiency, he traced a dark picture of the situation. This was also the message on the front page of the paper where a headline read 'Kyoto Protocol in place, but Portugal far off target'. A few days earlier, the decision by the European Union not to define new quantitative targets for its emissions and to opt for a wait-and-see approach was also represented in a critical light with inclusion of comments by NGOs like Greenpeace (Garcia, 2005a).

On 17 February 2005, two pieces focused on interstate issues. While one spoke of the limitations of Kyoto in face of the reductions needed to address climate change and mapped resistances and offences, with analysis of the positions of China, the USA and other countries (Fernandes, 2005b), the second one, headlined 'Two difficult steps' (Garcia, 2005c), identified the two main challenges posed to the 'international community': fulfilling the Kyoto commitments and reaching a post-Kyoto agreement. Again, climate change was here framed as a matter of international politics.

There were similarities in the representations of climate change in the four media in this period. It is perhaps not surprising that all chose to refer to the international politics surrounding the Kyoto Protocol, and that the US's withdrawal from the process and the challenges involved in reaching consensus were highlighted. There was acknowledgement of the Protocol as a positive move but there were also reservations and doubts. Hence, one cannot speak of generalized optimism. All the media we analysed referred to the Portuguese performance with regard to GHG emissions and conveyed a negative outlook. *Público* produced the most thorough analysis thereof.

d) Reading the state of knowledge and projecting the future

The IPCC's 4th AR was prepared by over 600 authors from 40 countries and reviewed by a similar number of scientists, as well as by governments. Working Group I (WG I) assessed the scientific knowledge on the drivers of climate change and projections for the future. The Summary for Policy-makers of the WG I's part of the report was discussed meticulously and agreed on a line-by-line basis by representatives of 113 governments at a meeting in Paris and publicly presented on 2 February 2007.

In this critical period, several articles in *Correio da Manhã* were close to an *alarmism* discourse in the sense that they put a great emphasis on risk (or the threats) posed by climate change. The lexicon and the metaphors present in some of the texts were emotionally charged and suggestive of impending negative events: 'On the way to climate disaster' (I. Ramos, 2007); 'Climate turned inside out' (D. Ramos, 2007); 'Earth threatened by warming' (A.P./F.J.G., 2007); 'Water threatens Portugal' (Saramago, 2007a). One article carried a particularly demoralizing

message: ‘Experts claim that the Earth has reached the point of no return. This means that even with all the good will of the most developed countries in the world, which are most responsible for greenhouse gas emissions, climate change and environmental catastrophes are a reality about to happen’ (A.P./F.J.G., 2007).

Still, articles that suggested that it was already ‘too late’ and that there was no point in acting were relatively rare. For instance, in an article entitled ‘On the way to climate disaster’, the journalist wrote that ‘There is little time left to stop the process’ (I. Ramos, 2007). This is an acknowledgement of the urgency of action rather than of the uselessness of action. Nevertheless, the headline may be considered alarmist – the adverbial phrase ‘on the way to’ locates an undetermined subject (presumably the planet and all its inhabitants) en route to ‘disaster’. There is a great extent of fatalism in this discursive construction.

To put this type of discourse into perspective, it should be noted that these were only four out of the 18 articles on climate change published in this period[6]. While in most articles, there was no clear option for a fearful or hopeful discourse, there were several where optimism regarding the establishment’s capacity to deal with the problem was clearly present (Cotrim/Lusa, 2007; Queiroz, 2007).

Visão did not publish any articles on the IPCC’s AR. On 15 February it carried several pieces on hybrid cars. As expectable, there were references to CO_2 emissions but the main focus was on the ‘fashionable’ nature of these cars, which many ‘famous’ people were driving (Montez, 2007). Purchasing these cars was presented as the solution to climate change: a clear example of techno-optimism associated with personal actions.

Expresso dedicated the whole month of February 2007 to the environment. In its 3 February issue, it carried 15 articles that mentioned climate change. Several focused on intergovernmental politics (e.g., Cardoso, 2007; Gautrat, 2007) while others referred to specific issues such as processing of waste, an art exhibit with environmental concerns and the attempts by some institutions to be carbon neutral, from the Rock in Rio concert to *Expresso* itself. These articles were of a variety of genres, from editorial to humour. They are important because they denote a widening of the analysis of the sources and the meanings of climate change, as well as some reflexivity.

The headline of *Expresso*’s main article on the 4th IPCC AR, ‘Climate change has human causes’ (*Expresso*, unattributed, 2007a), is a journalistic oddity in the sense that it conveyed a

[6] There was one more article that had elements of alarmism – ‘Politicians do not foresee the dimension of the catastrophe’ (Azenha, 2007) – but also of some hope in the resolution of the problem. Under the headline ‘Scandal hits global warming’ (Saramago, 2007b), typical of a popular paper, *Correio da Manhã* carried a piece on 3 February 2007 which spoke of evidence having been ‘distorted’ by the IPCC to avoid alarmism; a ‘climate of suspicion’ among the UN delegates to the Paris meeting; and of accusations of members of the IPC ‘giving in to pressures’ to convey a less dramatic account of the knowledge on climate change.

message that was not news. The anthropogenic origin of climate change had been asserted with an increasing degree of confidence since the 2nd IPCC AR in 1996. Therefore, the choice of headline can arguably be associated with a culture of relative climate change scepticism in this newspaper.

An editorial note in this issue justified the emphasis on environment and climate change by saying that these were important matters that deserved attention, even though 'we don't know to what extent human activity contributes to [climate change]' (*Expresso*, unattributed, 2007b). The newspaper opted for a discourse of 'pragmatism' and 'moderation': '*Expresso* does not intend to (…) conduct the opinion of its readers (…) We do not aim to go back to the stone age, not to use energy or forbid cars and polluting industries, but we know that if each of us and each company is a little more careful we will live a better future.' (ibid.) The IPCC's scenarios indicate that this 'little steps' approach is insufficient to address climate change. This discourse is typical of a historical period when environmental protection has become mainstream and opposition to it is socially unacceptable. It exemplifies continuing and powerful forms of resistance to the social transformations that are required to address the environmental crisis.

Another way of denying the need for change was present in an opinion article with the title 'A heated discussion'. It involved a strategy of dis-accreditation of those who claim for action. The following excerpt illustrates some of the lexical choices and metaphors employed in this kind of rhetoric: 'In the climate *conversation*, which has gained (…) a *holy* status, what impresses are not just the *anticapitalistic impulses* of the majority of the *tribe*. What impresses is the old illuminist idea that the *world is redesignable by human action only*.' (Coutinho, 2007; our emphasis).

The discursive terrain of *Expresso* is complex with a variety of discourses and framings. The leader of the SIAM project, Filipe Duarte Santos (2007), authored an invited editorial on 3 February entitled 'The risk and the challenge' where he explained what was at stake and presented the mitigation of GHGs and adaptation to climate change as the two available responses, seemingly value-neutral and equivalent. Research and development of renewable energies and of technologies for sequestering CO_2 were presented as the solution to achieve a sustainable world. A discourse of technological optimism such as this one is particularly powerful when originating in the field of science, which has a considerable social and political legitimacy. In other pieces the issue was represented in light of *economic rationalism*; for instance, Tomás and Franco (2007) focused on the carbon market, transactions, price fluctuations and alike, and constructed Kyoto as a financial burden.

Público published seven articles on climate change on 3 February 2007. Citing several scientists linked with the IPCC, the main article on the 4th AR emphasised the growth of confidence in scientific claims regarding the anthropogenic nature of climate change and in forecasts of the impacts of climate change (Garcia, 2007). The framing here was closer to

science than in the reports of the other media: for instance, the article explained the differences between the meaning of 'very likely' and 'likely' [that a certain temperature increase will occur]. Another piece on the AR's main conclusions (including remaining areas of uncertainty) followed the same line (*Público*, unattributed, 2007).

Garcia (2007) described several aspects of the process involved in writing up and negotiating international agreement on the AR: the pressure of some governments, the concessions, the adjustments, etc. This discursive (re)construction of science in its social contexts may contribute to a better public understanding; at the same time, such an account carries the risk of generating public suspicion in relation to science and scientific claims. In this article, however, the journalist reassured readers that they should trust the AR: 'Several of the report's main authors that *Público* listened to stated that the final version did not change the scientific conclusions'.

Other articles on 3 February 2007 included an overview of the standings on climate change of key states such as the US, the EU and Canada; the Portuguese absence in the IPCC meeting; the views of a representative of Quercus and of Ricardo Trigo, a Portuguese scientist. Even though the key event in this period was related to science, 19 articles focused on politics or claims made by politicians and only nine on science.

In the last period examined in this chapter, corresponding to the publication of the IPCC's 4th AR, we also examined television news coverage of climate change. We focused on the main news programme of the nationally broadcast television channels in Portugal: RTP1, RTP2 (then named 2:), SIC and TVI. In order to make our analysis more manageable we limited the data as follows. On the day of the public presentation of the IPCC's 4th AR, 2 February 2007, we compared the coverage in two randomly selected channels: 2:, part of the public broadcasting network RTP, and SIC, one of the commercial channels. In the rest of the period (16 January-16 February 2007), we opted for a random sampling of days and channels, adding to a total of 22 news pieces mentioning 'climate change' or any of the other search keywords.

In terms of methodology of analysis, we combined elements of Critical Discourse Analysis with semiotic analysis (Fiske and Hartley, 1978) in order to examine the multimodal messages of the news programmes. Keeping in mind the main theoretical references and the goals of this chapter we tried to answer the following questions: How were the risks associated with climate change represented? Which courses of action with regard to climate change were privileged and which agents were attributed responsibility in dealing with the problem?

On 2 February 2007, SIC's representation of the conclusions of the IPCC was relatively alarmist as a result of the word and image choice. The 'headline' (i.e., the words appearing on the screen at the beginning of the piece) that framed this news story was the following: 'Global

warming: ONU makes a dramatic appeal'. Against an orange background of what appeared to be rock (a meteorite?) and a ball of fire (a planet?), the anchor stated that the conclusions of the IPCC were 'frightening' (Figure 4). Although 'the experts say that some effects are already unavoidable, it is still possible to avoid the worst with an urgent intervention', he claimed. In the following piece, a journalist said that the IPCC had warned that the 'the world is in danger'. In a good example of the specificities of televised communication about this complex issue, SIC showed images of a variety of places where, it suggested, climate change was being felt: air pollution in China, flooded streets in Asian towns (Figure 5), land affected by drought, and melting glaciers. This was taken further with a separate piece that the anchor introduced by saying: 'Today only there are several concrete examples that the weather seems in fact to be going mad'. The images that followed were of a sand storm which caused a yellow snowfall in Siberia; a storm in Florida with strong winds and rain; heavy snow and ice that caused car accidents in other regions of the US and in Canada; torrential rain and flooding in Jakarta; a tornado alert and flooding in Australia.

Television may have an unparalleled potential in the creation of a sense of immediacy and urgency. But how do we move forwards from there? The ways in which television links the problem of climate change with solutions are crucial for understandings of how we can address this issue. In SIC's reporting on 2 February 2007, the audience was told that 'specialists insist that alternative energies are the only way out' while images of dozens of modern windmills were shown. After this deterministic statement about technical solutions, a separate piece focused on the need to reduce the use of fossil fuels and referred examples of solutions that were mostly associated to governmental measures: 'the EU has demanded less-polluting cars'; 'the British have a new tax for people who fly' and the 'US state of California sued the car industry demanding to be financially compensated for pollution'. There was no reference to individuals, to corporations or to local authorities.

Figure 4. Jornal da Noite, SIC, 2 February 2007

Figure 5. Jornal da Noite, SIC, 2 February 2007

In 2: the headline of the opening piece on 2 February 2007, 'Global warming: a human cause', focused attention on scientific certainty about human responsibility in the causation of climate change. The starting imagery, consisting mainly of world temperature maps (Figure 6), was more sober and closer to science's than the one used by SIC. Through the voice of the news anchor we hear about forecasts of 'multiple extreme phenomena' and the possibility of 'millions of climate refugees' in the future. Later, interviews with participants in the IPCC meeting were interspersed with images of the disappearance of glaciers and of floods.

Figure 6. Jornal 2, 2:, 2 February 2007

Figure 7. Jornal 2, 2:, 2 February 2007

Interviewees proposed diverse ways forward. First, there was an unidentified man who could be a scientist or a politician, saying: 'What we now have is the power of science that enables citizens to go to their leaders, to businesses, to supermarkets, to car dealers, to energy companies and to ask 'what are you doing about these findings? How are you being a part of the solution? How are you helping to address the greatest threat to our life on this planet?'' This was followed by an interview with Durão Barroso, President of the European Commissions (Figure 7), who maintained that 'there's a whole technical set of mechanisms [sic] that go from

investment in technology to (…) emissions trading that allow, according to all available scientific evidence, reaching a 20% reduction in GHG by 2020'. Finally, Jacques Chirac, the President of France, was shown proposing the creation of an international organization in the field of the environment in order to address the problems we are faced with. These proposals represent various discourses: democratic pragmatism with hints of sustainable development; *economic rationalism* mixed with *techno-optimism*; and faith in international politics, which could represent a form of *administrative rationalism*.

Due to space constraints, we will only refer briefly to the remaining news pieces that were analysed. Five stories focused on the impacts of climate change; three of those were linked to the publication of a scientific report of the SIAM project and were shown on the same day (22 January). They included an interview with Filipe Duarte Santos. Another six stories referred to the intergovernmental politics of climate change and especially the European Union's (EU) plans in this area. The EU and governments were the main actors here. There were ten pieces on renewable energies in the news programmes that we analysed. All but one were excluded from our sample as they did not refer to climate change even though nearly all referred to the 'environment' or to 'green' energy; five of these involved governmental actors. Finally, five stories focused on other policies to reduce GHGs, four of which on a legal change in car taxation in Portugal. The argument presented for the change was the need to reduce 'pollution' and no link was made with climate change, which led to the exclusion of those stories. The rest of the news stories in the sample referred to isolated topics such as Al Gore's visit to Portugal and an action by Greenpeace.

4. Conclusions

The analysis of the Portuguese press suggests that *alarmism* is not a very common 'linguistic repertoire' (Ereaut and Segnit, 2006). In *Público* and *Expresso,* even the articles that present some of the starkest forecasts about the impacts of climate change cannot be considered alarmist in the sense that scientific claims do not appear to have been exaggerated by journalists nor can it be reasonably argued that newspapers exploited feelings of fear or promoted a fatalistic reading of climate change. Although it had some expression in the mid-market and popular press, alarmism was not dominant there either.

The case of television is somewhat different. Images are an important element in its search for 'facticity' and their use may promote more emotionally-charged – and possibly scientifically inaccurate – readings of reality. While science avoids establishing cause-effect links between the greenhouse effect and specific weather events, the language of television promotes, as we saw, a 'now and here'-type approach. Therefore, the very nature of the medium of communication leads to a tendency to represent climate change as a more tangible phenomenon than in the press. It also promotes a more dramatic picture of the issue because

video can only register what has already happened and therefore cannot be avoided. Still, televised news stories tended to emphasise the need to act urgently rather than it the idea that 'It's too late! (So we might as well slit our wrists, or carry on polluting).' (Ereaut and Segnit, 2006: 12).

Optimism cannot be considered dominant either. The idea that is up to the political system to solve the problem of climate change underpinned many articles but, despite this attribution of responsibility to the 'establishment', most media did not promote a belief in the ability of Portuguese political institutions to do it. As we have seen with the case of television stories, there appears to be signs of *techno-optimism* with associations of renewable energies with innovation, economic competitiveness and environmental protection. However, this is not normally linked explicitly with the struggle against climate change.

The study reported here leads us to conclude that Ereaut and Segnit's (2006) categorization of discourses into *alarmism* and *optimism* (with the variation of *pragmatic optimism*) is an excessive simplification of the variety and complexity of discursive constructions of climate change found in the media.

In the terms of Dryzek's (1997) discourse categories, we found that *administrative rationalism* is dominant in the discourse of social actors and also has an important presence in the media. *Ecological modernization* and *economic rationalism* also have a significant expression. The solution for climate change is generally expected to come from the state and/or from the market with technology playing a role as well. There were no clear instances of either *survivalism* or *prometheanism* in the Portuguese media that we analysed (although some pieces in *Expresso* went somewhat in the direction of *prometheanism*). *Green romanticism* and *green rationalism* were also absent from the discourses of social actors and the media as no substantial transformations were called for in either human consciousness or political structures.

Governmental actors were frequently present in the media representation of climate change and so were their views, positions and proposals. Although there were several critical views of governmental performance in the press, analyses of political alternatives were relatively sparse (*Público* stood out in this respect, offering more frequent and more in-depth policy analysis). International political events, and especially intergovernmental summits, have tended to lead to most media coverage. In contrast, key national decisions have not sufficiently scrutinized, as we saw with PNAC and PNALE. Corporate responsibility, a key aspect in terms of causes and solutions for climate change, has rarely discussed in the media. It should also be noted that the voices of civic groups have a relatively low visibility in the media (Quercus is the most commonly mentioned NGO, which fits in with their proactivity in communicating about climate change). The analysis of wider corpora of texts than what is covered in this paper has led us to conclude that there is a gap in terms of cross-sectoral analysis as well, given that neither the

media nor other social actors normally examine the GHG impact of new road systems or land use planning, for example.

Climate change is thus viewed mainly as a matter of international politics with the primary locus for governance of the issue being the 'global'. There is therefore a disconnect between the 'global' problem and its preferred 'global governance' and many of the actual national and – particularly – local forms of causation. The naturalization of this particular way of relating to climate change is likely to discourage citizen individual and collective agency.

Scientific knowledge on climate change is generally represented as consensual in the Portuguese media regarding the nature of the problem and the anthropogenic factors that produce it. *Expresso* occasionally gives some space to 'sceptical' views but most of the cases it does so in less 'serious' genres than news, such as opinion articles and humour, i.e., scepticism comes in a dissimulated way; still, this 'muted' scepticism represents less than 5% of the total number of texts.

In order to understand media discourse on climate change research needs to go beyond journalism and examine the discourses of different social actors. This paper has examined these two aspects but has done so in a relatively separate fashion. Future studies should aim to bridge these domains and incorporate analysis of both media texts and the communicative strategies of social actors, as well as the media's production practices, including professional routines, values and organizational constraints.

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References

A.P./F.J.G. (2007) 'Terra ameaçada pelo aquecimento', *Correio da Manhã*, 25 January.

Azenha, A. S. (2007) 'Políticos não antevêem dimensão da catástrofe', *Correio da Manhã*, 11 February.

B.C.M. (2005) 'Protocolo de Quioto entra em vigor', *Correio da Manhã*, 16 February.

Bickerstaff, K. and Walker, G. (2001) 'Public Understandings of Air Pollution: The 'Localisation' of Environmental Risk', *Global Environmental Change* 11 (2): 133-45.

Boykoff, M. and Roberts, J. T. (2007) *Media Coverage of Climate Change: Current Trends, Strengths, Weaknesses*, United Nations Development Report, Occasional paper, 2007/3.

Boykoff, M.T. and Boykoff, J.M. (2007) 'Climate Change and Journalistic Norms: A Case-study of US Mass-media Coverage', *Geoforum* 38: 1190-204.

Cabecinhas, R., Lázaro, A. and Carvalho, A. (this volume) 'Media Uses and Social Representations of Climate Change'.

Cardoso, R. (2007) 'Uma terra não chega', *Expresso*, 3 February.

Carvalho, A. (2005) 'Representing the Politics of the Greenhouse Effect: Discursive Strategies in the British media', *Critical Discourse Studies* 2 (1): 1-29.

Carvalho, A. (2007) 'As Alterações Climáticas no Ciberespaço Português: Mediações dos Saberes e dos poderes' [Climate Change in the Portuguese Cyberspace: Mediations of Knowledges and Powers], *Revista de Comunicação e Linguagens* 38: 253-63.

Carvalho, A. (2007b) 'Ideological Cultures and Media Discourses on Scientific Knowledge: Re-reading News on Climate Change', *Public Understanding of Science* 16 (2): 223-43.

Carvalho, A. (2008) 'Media(ted) Discourse and Society: Rethinking the Framework of Critical Discourse Analysis', *Journalism Studies* 9 (2): 161-77.

Carvalho, A. and Burgess, J. (2005) 'Cultural Circuits of Climate Change in UK Broadsheet Newspapers, 1985-2003', *Risk Analysis* 25 (6): 1457-69.

Conselho de Ministros (2001) 'Comunicado do Conselho de Ministros de 10 de Maio de 2001', URL (consulted December 2005): http://www.portugal.gov.pt/Portal/PT/Governos/Governos_Constitucionais/GC14/Comunicados_e_Conferencias_de_Imprensa/20010510.htm

Conselho de Ministros (2003) 'Resolução que Aprova as Orientações da Política Energética Portuguesa – Resolução do Conselho de Ministros n. 63/2003', URL (consulted December 2005): http://www.portugal.gov.pt/Portal/PT/Governos/Governos_Constitucionais/GC15/Ministerios/MEc/Comunicacao/Outros_Documentos/20030313_MEc_Doc_Politica_Energetica.htm

Corbett, J. and Durfee, J. (2004) 'Testing Public (Un)Certainty of Science: Media Representations of Global Warming', *Science Communication* 26 (2): 129-51.

Cotrim, A./ Lusa (2007) 'Poluidores penalizados', *Correio da Manhã*, 25 January.

Coutinho, J. P. (2007) 'Uma discussão acalorada', *Expresso*, 9 February.

DEFRA (2006) 'Tomorrow's climate. Today's challenge'. Booklet. DEFRA: n/p.

Dryzek, J. (1997) *The Politics of the Earth: Environmental Discourses*. Oxford: Oxford University Press.

Dunlap, R. E. (1998) 'Lay Perceptions of Global Risk – Public Views of Global Warming in Cross-national context', *International Sociology 13* (4): 473-98.

Ereaut, G. and Segnit, N. (2006) *Warm Words: How are We Telling the Climate Story and Can We Tell it* Better? London: Institute for Public Policy Research.

Expresso, unattributed (2003a) 'Árctico a derreter', *Expresso*, 23 August.

Expresso, unattributed (2003a) 'Área ardida igual ao Algarve', *Expresso*, 28 August.

Expresso, unattributed (2004) 'Bónus nas emissões', *Expresso*, 20 March.

Expresso, unattributed (2005) 'Impasse no ambiente', *Expresso*, 18 February.

Expresso, unattributed (2007a) 'As alterações climáticas têm causa humana', *Expresso*, 3 February.

Expresso, unattributed (2007b) 'Causas que valem a pena', *Expresso*, 3 February.

Fernandes, A. (2005a) 'O martelo de Raúl Estrada', *Público*, 16 February.

Fernandes, A. (2005b) 'O primeiro dia da luta contra as alterações climáticas', *Público*, 17 February.

Fernandes, A. (2005c) 'Pequeno guia para Quioto', *Público*, 16 February.

Fernandes, A. and Garcia, R. (2005) 'O mundo quase unido contra as alterações climáticas', *Público*, 16 February.

Fiske, J. and Hartley, J. (1978) *Reading Television*. London: Methuen.

GAIA/GEOTA/LPN/Quercus/CPADA (2004) 'Alteração Climáticas: Plano Português dá Licença para Emitir', 1 April, URL (consulted January 2006): http://quercus.sensocomum.pt/pages/defaultArticleViewOne.asp?storyID=497

Ganhão, M. (2004), 'Governo trava ecotaxas', *Correio da Manhã*, 18 March.

Garcia, R. (2003) 'Este é o Verão de todos os recordes em Portugal', *Público*, 12 August.

Garcia, R. (2004) 'Governo permite aumento das emissões poluentes até 2008', *Público*, 18 March.

Garcia, R. (2005a) 'Bruxelas adia novas metas para gases com efeito de estufa', *Público*, 10 February.

Garcia, R. (2005b) 'Plano nacional ainda está longe da concretização', *Público*, 16 February.

Garcia, R. (2005c) 'Dois passos difíceis', *Público*, 17 February.

Garcia, R. (2007) 'Cientistas e governos reforçam tese da culpa humana', *Público*, 3 February.

Gautrat, P. (2007) 'Para uma governança ecológica mundial', *Expresso*, 3 February.

Gonçalves, F. (2005) 'Protocolo de Quioto atacado em Setúbal', *Correio da Manhã*, 17 February.

L., P. (2005) 'Vem aí o carbono', *Expresso*, 18 February.

McComas, K. and Shanahan, J. (1999) 'Telling Stories About Global Climate Change: Measuring the Impact of Narratives on Issue Cycles', *Communication Research* 26 (1): 30-57.

McCright, A. and Dunlap, R. (2000) 'Challenging Global Warming as a Social Problem: an Analysis of the Conservative Movement's Counter-claims', *Social Problems* 47 (4): 499-522.

Ministério das Finanças/Ministério da Economia (2003) 'Proposta de Reestruturação do Sector Energético Português', URL (consulted December 2005): http://www.portugal.gov.pt/Portal/PT/Governos/Governos_Constitucionais/GC15/Ministerios/MF/Comunicacao/Outros_Documentos/20030403_Gov_Doc_Sector_Energetico.htm

Ministério do Ambiente e do Ordenamento do Território (2005) 'Sessão Pública de Apresentação do Pacote Legislativo Alterações Climáticas 'Vencer na Economia do Carbono', URL (consulted December 2005): www.portugal.gov.pt/NR/rdonlyres/EECC9AD2-0AE8-4298-B125.../0/PNAC_Portugal_Alteracoes_Climaticas.pdf

Moser, S. C. and Dilling, L. (eds.) (2007) *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change*. Cambridge: Cambridge University Press.

Nave, J. G. and Schmidt, L. (2002*) As Alterações Climáticas no Quotidiano: Estudo Comportamental de Curta duração. Relatório Final* [Climate Change in Daily Life: Short-duration Study of Behaviours. Final Report]. Lisbon: ISCTE.

Oliveira, L., Ruela, R. and Sá, S. (2003) 'Clima: Um calor de loucos', *Visão*, 14 August.

P.L. (2005) 'Vem aí o carbono', *Expresso*, 18 February.

Público, unattributed (2003) 'Onda de calor não prova aquecimento global', *Público*, 8 August.

Público, unattributed (2004) 'EDP defende que o plano tem custos', *Público*, 18 March.

Público, unattributed (2007) 'As principais conclusões do relatório', *Público*, 3 February.

Queiroz, M. (2007) 'Cientistas de acordo', *Correio da Manhã*, 3 February.

Quercus (2003) 'Alterações Climáticas - Portugal em Relação ao Mundo e à União Europeia em Termos de Emissões', 9 December, URL (consulted January 2006): http://quercus.sensocomum.pt/pages/defaultArticleViewOne.asp?storyID=256

Quercus (2006) 'Alterações Climáticas - Novo PNAC Mostra Incapacidade de Portugal na Implementação de Medidas para Cumprir Quioto, a Menos de 2 Anos do Prazo', 31 January, URL (consulted February 2006): http://quercus.sensocomum.pt/pages/defaultArticleViewOne.asp?storyID=1520

Ramos, D. (2007) 'Clima virado do avesso', *Correio da Manhã*, 24 January.

Ramos, I. (2003a) 'Mais dias de calor por ano', *Correio da Manhã*, 10 August.

Ramos, I. (2003b) 'Vem aí mais calor', *Correio da Manhã*, 14 August.

Ramos, I. (2003c) 'Taxa sobre o carbono é decisiva', *Correio da Manhã*, 10 August.

Ramos, I. (2007) 'A caminho do desastre climático', *Correio da Manhã*, 4 February.

Ribeiro, L. (2005a) 'Aí está ele!', *Visão*, 10 February.

Ribeiro, L. (2005b) 'O elo mais fraco', *Visão*, 10 February.

Sá, S. (2003) 'Sem fim à vista', *Visão*, 7 August.

Santos, F. D. (2007) 'O risco e o desafio', *Expresso*, 3 February.

Saramago, J. (2007a) 'Água ameaça Portugal', *Correio da Manhã*, 22 January.

Saramago, J. (2007b) 'Escândalo atinge aquecimento global', *Correio da Manhã*, 3 February.

SIAM (2006) URL (consulted May 2006): www.siam.fc.ul.pt.

Tomás, C. (2005) 'Quioto por cumprir', *Expresso*, 18 February.

Tomás, C. and Franco, H. (2007) 'Cumprir Quioto sai-nos do bolso', *Expresso*, 3 February.

Trumbo, C. (1996) 'Constructing Climate Change: Claims and Frames in US News Coverage of an Environmental Issue', *Public Understanding of Science* 5: 269-73.

UNFCCC (2008) 'National Greenhouse Gas Inventory Data for the Period 1990–2006', FCCC/SBI/2008/12, available from URL (consulted December 2008): http://unfccc.int/documentation/documents/advanced_search/items/3594.php?rec=j&priref=600004891#beg

UNEP (s/d) www.grid.unep.ch/product/publication/download/ew_heat_wave.en.pdf

UNEP/ Futerra (2005) *Communicating Sustainability: How to Produce Effective Public Campaigns*. Nairobi: United Nations Environment Programme.

Weingart, P., Engels, A., and Pansegrau, P. (2000) 'Risks of Communication: Discourses on Climate Change in Science, Politics, and the Mass Media', *Public Understanding of Science* 9: 261-83.

Wilson, K. (1995) 'Mass Media as Sources of Global Warming Knowledge', *Mass Communication Review* 22 (1-2): 75-89.

Authors information

Anabela Carvalho (PhD, University College London) has done research on various aspects of the communication of climate change. Her interests also include the mediated communication of science, political and social issues, political communication and discourse analysis. She is Assistant Professor at the University of Minho and Chair of the Science and Environment Communication Section of the European Communication Research and Education Association (ECREA).

Institutional affiliation and contacts: Centro de Estudos de Comunicação e Sociedade, Universidade do Minho, Campus de Gualtar, 4710-057 Braga, Portugal

Email: carvalho@ics.uminho.pt

Eulália Pereira has a degree in Communication Sciences from Universidade Nova de Lisboa and is enrolled in the Master's on Science Communication and Education at Universidade de Aveiro. She worked previously as a journalist and was Research Assistant to the project 'The Politics of Climate Change: Discourses and Representations'.
Institutional affiliation and contacts: Centro de Estudos de Comunicação e Sociedade, Universidade do Minho, Campus de Gualtar, 4710-057 Braga, Portugal
Email: eulaliaspav@gmail.com

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Available from: http://www.lasics.uminho.pt/ojs/index.php/climate_change

7

Climate change and the daily press: Did we miss the point entirely?

Cecilia Rosen Ferlini and Javier Crúz-Mena

Abstract

Even though most of the public debate regarding climate change seems to be centered today on the politics of potential post-Kyoto agreements and, to some extent, on the science and technology of mitigation and adaptation, the old questions of whether such a thing as 'global warming' actually exists and whether or not industrialised society is to blame for it still pop up every now and then in the media. This persistence ought to be surprising because the Third Assessment Report (TAR) issued in 2001 by the Intergovernmental Panel on Climate Change (IPCC) was quite clear in its statement that climate change is real and most probably caused by human activity. We have made a partial review of the coverage of the various Reports issued by IPCC during 2001 to analyse the degree to which the daily press identified (or not) this qualitative shift and whether or not it characterised it as representative of a scientific consensus regarding these two points. Our data suggests that the shift in discourse was not entirely lost on what could be characterised as 'prestige press', but that Mexican dailies remained oblivious to it throughout the news cycle. We also present a model of science journalism's functionality to assess the degree to which these qualitative differences in coverage may have be relevant to the public.

Keywords: climate change, science journalism, IPCC

1. Introduction

In a rather casual commentary caught on TV the leader of the opposition in Spain, Mariano Rajoy, managed to put himself – and a certain cousin of his – on the wrong side of the spotlight by stating that climate change 'cannot be turned into the greatest world problem', given that not even 'the world's ten most important scientists can guarantee tomorrow's weather in Sevilla (El País, 2007a).' Quite clearly, Rajoy made the common mistake of confusing *weather* with *climate*. Admitting that he doesn't 'know a lot' about this matter, Rajoy, a candidate to become Spain's Prime Minister, opted to quote his cousin, a Physics Professor. 'I assume *he* must know', he said, and then proceeded to display their ill-fated argument: If tomorrow's weather cannot be predicted by even the best scientists, 'how can anybody say what will happen in the world in 300 years?'

Whether or not Rajoy's scepticism is representative of what a sizable portion of the population believes to be true concerning climate change, it is, at the very least, a high profile example of how the principle of authority can be invoked to question the wisdom of some experts based solely on the differing opinion of some other experts. Incidents such as this have more than merely anecdotal value because the media tend indeed to rely heavily on 'expert opinion' as valid sources to back up nearly all sorts of claims. And although a simple 'tit for tat' strategy may seem appropriate to reach balance in press coverage, this is not necessarily the case when the subject involves scientific controversy (Mooney, 2004). The risk is that by giving equal weight to different experts (whether or not their expertise is equally legitimate), journalists may breathe artificial life into controversies already settled among scientists.

Here we hypothesise that this may well have been the case with the coverage of climate change of anthropogenic origin. We postulate that the year 2001 marks a turning point in the subject inasmuch as it was the first time that the Intergovernmental Panel on Climate Change (IPCC) explicitly formulated and answered the two questions most relevant to the debate (IPCC, 2001). We will examine the reasons why most of the media consider the IPCC to be the ultimate expert source on the subject, and so, once the Panel reached a consensus on the existence and the causes of global climate change, the scientific debate may be considered to have reached a point, during 2001, in which, if not entirely over, at the very least the focus changed from existence and sources to the more pressing issues of vulnerability, impact and adaptation. In very simple words, the IPCC Reports of 2001 were an announcement to the world that climate researchers were sufficiently satisfied that the global climate was indeed changing and that humankind was in no small measure behind the observed trends.

In this work we set out to examine to what extent the daily written press relayed to its public this shift in the scientific debate, comparing the coverage in Mexico and abroad. Furthermore, we develop a model of quality in science journalism with the aim of analysing how relevant the differences in coverage may have been for the general public.

2. The climate debate

Rajoy's episode, late in 2007, happened in an environment in which most of the Spanish press either expressly condemned or mocked it, or at least presented it in such a light that left him vulnerable to criticism (El País, 2007a). This, however, has not always been the case. It could be argued that until quite recently some media outlets still lent credence to sceptics nearly just as much as to IPCC members, which led to comparable space and/or time in coverage and left the impression that the debate was still wide open among experts (Rosen, 2007). It is easy to see how this would tick off those who are in the know regarding the science of climate change, but our concern here is with the average citizen, who may depend on the media to acquire relevant information.

We thus turn first to IPCC as a journalistic source for science writers covering the global climate debate. It is worth noting that the Panel shies away from calling itself 'the ultimate authoritative voice' on the matter, as many media outlets routinely do. What it does state indeed is that 'a main activity of the IPCC is to provide in regular intervals an assessment of the state of knowledge on climate change' (IPCC, 2007). It can be argued that it is correct to have chosen the singular in 'the state of knowledge' based on the fact that IPCC's Reports convey the agreement not only amongst its close to 3,000 experts but also of government representatives and stake holders which are supposed to go through these documents line by line before they are made public. Rosen (2008) has made a detailed analysis of the way in which IPCC operates with the main goal of reaching consensual agreement on both the scientific facts behind climate change as well as the interpretations and predictions from those very facts.

We thus may consider IPCC as not only a legitimate source for science journalists, but indeed as an often indispensable one. It then follows that the presentation of IPCC's Reports, which so far has occurred only every 5 to 6 years, ought to be main news events for the international media. But what about other scientific sources, particularly those who do not share the interpretations contained in IPCC's Assessment Reports? In her analysis, which claims to be thorough but not exhaustive, Rosen (2008) was able to establish the huge disparity in the number of scientific papers with views contrary to IPCC in peer-reviewed journals. Conspiracy theories aside, these two facts might give journalists pause to consider how best to balance their coverage between sources. We argue, however, that regardless of how much space and/or time is devoted to contrary views[1], there appears to be no legitimate journalistic reason *not to* cover in depth the contents of IPCC Reports when they are released.

One such occasion took place in 2001, in a news cycle lasting from January to September of that year with at least four major events corresponding to the release of Reports from each of IPCC's three Working Groups plus the final Synthesis Report. The first (January 20, Shangai) and last (September 29, Wembley) deserve special attention in this work because they contain explicit claims which clearly shift the focus of the scientific debate regarding the existence of a global climate change and the weight of the human contribution to it. Table 1 shows the exact phrases contained in the documents 'Climate Change 2001: The Scientific Basis' (IPCC, 2001a) and 'Climate Change 2001: Synthesis Report' (IPCC, 2001b). If the average reader were to pose the following questions: 'Is global warming for real?' and 'Is humankind in any significant way causing it?', then reading these few phrases ought to at least let the public know that thousands of scientists participating in IPCC along with government representatives from hundreds of nations have reached a consensus on both questions, and, furthermore, that in both cases the answer is affirmative. These are by no means extremely technical questions,

[1] Rosen (2008) also noted that there is no such thing as a coordinated opposition to IPCC on the science of climate change, but rather a dispersed chorus of so called *contrarians.*

only imaginable from the brightest of minds, highly specialised in climate science. These are, on the contrary, precisely the sort of questions that one might expect ordinary people to be pondering regarding climate change.

So a great divide appears to have formed as early as 2001 between the experts on the field and the common citizen. Our question here is this: should the press have done something about it?

Table 1. Exact phrases quoted from Reports made public by IPCC in 2001 in which the Panel explicitly addresses the questions of existence of global climate change and human contribution to it.

Climate Change 2001: The Scientific Basis	**Climate Change 2001: Synthesis Report**
'The global average surface temperature has increased over the 20th century by about 0.6°C'. 'Temperatures have risen during the past four decades in the lowest 8 kilometres of the atmosphere'. 'Changes have also occurred in other important aspects of climate'.	'The Earth's climate system has demonstrably changed on both global and regional scales since the pre-industrial era, with some of these changes attributable to human activities'.
'An increasing body of observations gives a collective picture of a warming world and other changes in the climate system'.	'An increasing body of observations gives a collective picture of a warming world and other changes in the climate system'.
'Concentrations of atmospheric greenhouse gases and their radiative forcing have continued to increase as a result of human activities'.	'Concentrations of atmospheric greenhouse gases and their radiative forcing have continued to increase as a result of human activities'.
'There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities'.	'There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities'

3. A functional model for journalism

The question of what is the press expected to do with the information it gathers lies at the heart of the debate over the purpose of journalism. It is, furthermore, essential to our analysis since we aim to gauge the social relevance of failing to convey to the public the shift in the scientific discussion of climate change.

There is a plethora of ideas regarding the social purpose of journalism. We have placed our starting point alongside Kovach and Rosenstiel (2001), who state that 'the primary purpose of journalism is to provide citizens with the information they need to be free and self-governing.' Alas, such a statement begs the question of how exactly can regular citizens make use of their daily newspaper or favourite radio newscast to reach as grand a purpose as exercising freedom

and government for themselves. Without losing any of the soundness of Kovach and Rosenstiel's postulate, we argue that the practical side of it can be seen more easily from the vantage point of the practising journalist. Take, for instance, the Report from IPCC's Work Group 1 on the scientific basis of climate change, released in January 2001. There may have been as many ways of deciding which information points to include in any specific note as there were journalists writing notes about it. However, those who had the social function of journalism on their minds would very likely have tried to identify the information which would leave their public in better position to make use of their freedom and to influence their own government on the issues. This, of course, is not an easy task, for each citizen has its own particular way of trying to go about the business of putting their freedom to good use. And while some are quite vocal and place calls to their representatives or write letters to the papers, most tend to believe that the only instance of action available to them comes at the voting booth once every number of years. How, then, can journalists be expected to prioritise, in line with the social function of their trade, the huge amount of information to which they are exposed by IPCC?

We propose that the answer, and indeed a system for identifying specific information points, stems from the very question of how can citizens use information from the media in any significant way. Whether they exercise their freedom very often or only when they vote, the one thing that every citizen can do is *decide*. And it is precisely here that journalists can try to serve their public by giving them, at the very least, the information which they deem most relevant to their decision processes regarding the issues they are informing them about.

We have thus arrived at a functional model for journalism which pins the quality of the coverage at least partly on whether or not it satisfies its social purpose by giving the public the information needed to make relevant decisions. The advantage for the public should be obvious. And for their part, journalists operating under these philosophy may find themselves in a better position to sift through large volumes of information guided by the purpose of looking first and foremost for those points without which their public would be in a weaker position to make decisions.

4. The model at work

We can now go back to the two questions which we hypothesised that the general citizen might want to have answered regarding the debate on climate change back in 2001. Except that now, instead of looking to the media to read or hear or see someone else's answers (be it a legitimate expert on the field or Rajoy's cousin), each citizen will be given information intended to help them make up their own minds. They may of course choose not to do so, if they are more inclined to invoke the principle of authority. But this is irrelevant to the journalist who decides to inform the decision process, regardless of whether the decision will be made or

deferred. Once the journalist has identified the most important decisions the public might want to make, the method will systematically prioritise the information points towards that end.

Table 2. Decision grid. The left column contains potential decisions that citizens might want to be able to make, and on the right we show information points extracted from IPCC reports which we deem relevant to the decision processes

Decisions	Information points from IPCC Reports
Is there really such a thing as *global warming*?	• Mean temperature records reported by IPCC show a sharp increase in recent decades, driving the total rise to 0.6ºC ± 0.2ºC during the 20th century
Why do scientists think that global warming is not due to natural climate variability?	• These increases in mean global temperature are unprecedented in the historical record of the last few centuries (the famous 'Hockey stick' graph) • Numerous computer simulations of global climate show that, without CO2 forcing, the planet would probably have not increased its mean global temperature nearly as much
Why do scientists think that human activities are responsible for global warming?	• Human activities have significantly increased CO2 emissions to the atmosphere since the current industrial era began • According to the greenhouse model of atmospheric climate, greenhouse gases have the effect of trapping heat in the atmosphere, thus driving the increase in mean global temperature • Graphs of mean global temperature vs. time strikingly follow the corresponding graphs of CO2 concentration in the atmosphere
How dangerous is this warming trend?	• Coastal areas and small islands will be vulnerable to rises in sea level • Extreme weather events will tend to be even more extreme more frequently
What demands could I make from my government in relation to climate change?	• Local planning based on the review of suggested strategies and available technology for mitigation of greenhouse gas emissions and adaptation to climate change

Earlier we proposed that the average citizen might have faced two specific questions about climate change in January 2001: 'Is global warming for real?' and 'Is humankind in any significant way causing it?' It seems quite hard to find any other questions as legitimate or as urgent as these two. More importantly, they are at the root of potential decision processes by the public, and thus they could guide journalists in their coverage. The key is to construct a simple table containing a few decisions that citizens might want to be able to make, and then

searching for the information points which seem to be more relevant to those decisions. For the case of IPCC's Reports of 2001, Rosen (2008) elaborated the array shown in Table 2. Slightly rephrasing our two original questions and expanding them into a few more subsidiary ones we composed a grid with five potential decisions and the corresponding information points to enrich the decision processes. Note that all information points in Table 2 can be extracted from any of the four reports released by IPCC during 2001, and so all of them were readily available to journalists covering climate change. In this way, the coverage is guaranteed to have at the very least information which has been deemed to be essential to help citizens make up their minds on issues in which they have the potential to decide either to take action or to demand action from their governments. Or, in the words of Kovach and Rosenstiel's original statement, 'to be free and self-governing.' Since all these considerations apply just as well to those cases in which the essential information happens to come from scientific sources, we can trivially extrapolate the model to the field of science journalism (Crúz-Mena, 2002).

5. Methodology

Once a model is available to gauge the quality of press coverage on its functionality one can proceed to perform content analysis in search of specific information points. In the case under study, concerning the reports from IPCC in 2001, we were interested in the question of whether the press relayed the relevant information for the public to be able to decide if global climate change was for real and to what extent did humankind have a hand on it. This information may have appeared in the form shown on Table 2 or in any other equivalent formulation.

We analysed the coverage of three nationally distributed Mexican daily newspapers (La Jornada, Reforma and El Universal) and three major overseas dailies (Le Monde, from France; El País, from Spain; and The New York Times, from USA)[2]. This choice is admittedly not exhaustive, but at least at the Mexican level it is indeed representative. Online searches and hard copy analysis were made for each newspaper from September 1, 2000 to January 1, 2002[3]. All in all, 29 notes were identified, as shown in Table 3. Details about the selection criteria and keywords used in search engines will be published elsewhere (Rosen, 2008). Two substantial differences jump out immediately between the coverage by Mexican newspapers and the three dailies abroad: the dimension of the coverage, as measured by the sheer number of notes, and the delay with which the Mexican press started following the trail of this global story.

[2] Results from Le Monde are not included in this study because the analysis is still ongoing.
[3] Originally we had set out to search only between January 1 to December 31, 2001, but we noticed some newspapers had ran stories as early as October 2000, so we decided to consider a lengthier news cycle.

Table 3. Summary of press coverage. A total of 29 notes were identified, 24% of which were published well in advance of the release of the very first report. The three Mexican newspapers studied account for 13.7% of the total coverage analysed in this study, or slightly less than 15% of the amount of notes published by the three foreign newspapers.

IPCC Meeting	The New York Times	El País	Le Monde	El Universal	Reforma	La Jornada
Total: 29	7	7	11	1	1	2
Advanced stories, October 2000	26/10/00 28/10/00		03/11/00 03/11/00 03/11/00 18/11/00 16/01/01			
The Scientific Basis (Shangai, January 2001)	18 /01/01 23/01/01	23/01/01	24/01/01			22/01/01
Impacts, Adaptation and Vulnerability (Geneva, February 2001)	19/02/01 22/02/01	14/02/01 19/02/01 20/02/01	21/02/01 21/02/01	20/02/01		19/02/01
Mitigation (Accra, March 2001)	10/02/01	06/03/01				
Plenary Meeting (Nairobi, April 2001)		03/04/01				
Synthesis Report (Wembley, September 2001)		25/09/01				
(No identified meeting)			21/02/01 07/03/01 27/03/01		19/04/01	

But the ultimate goal of our analysis, and indeed the test to which our method should be subjected, is the confrontation between the information points in our decision grid (Table 2) and the contents of the published notes. In retrospective, the most important piece of information to be gathered from all IPCC reports during 2001 was the consensus amongst scientists and government representatives regarding the existence of a marked warming trend in mean global temperatures and the partial contribution of human activities to this trend. In Table 4 we have isolated the exact phrases with which The New York Times and El País conveyed this particular

information point[4]. None of the Mexican newspapers informed about it. We also compared the rest of the information points in our Decision Grid to the actual coverage. A summary of this comparison is shown in Table 5, with dates and sources, when these were identified. It is worth noting that none of our information points was left without at least one of the newspapers having mentioned it. In the same vein, though, alternative hypotheses to the greenhouse gas model of global warning seem not to have been considered legitimate back in 2001, for only one newspaper picked it up, and then with no attributable source.

Table 4. Shift in scientific debate. All three Mexican newspapers failed to inform about the newly established consensus amongst scientists regarding the existence and partial human contribution to a global warming trend. (NYT=The New York Times; EP=El País)

Information Point	Date/Newspaper	Exact quote
IPCC confirms there is consensus amongst scientists regarding global warming	26/10/00 NYT	'Greenhouse gases produced mainly by the burning of fossil fuels are altering the atmosphere in ways that affect earth's climate, and it is likely that they have "contributed substantially to the observed warming over the last 50 years," an international panel of climate scientists has concluded. (…)This represents a significant shift in tone.'
	18/01/01 NYT	'The draft finds that the warming in the 20th century was likely to have been the greatest of any century in the last 1,000 years for the Northern Hemisphere and that the 1990's was the warmest decade of the last millennium.'
	23/01/01 NYT	'New evidence shows more clearly than ever that temperature increases are caused mostly by pollution, not by changes in the sun or other natural factors'.
	23/01/01 EP	'There is no doubt: human activities are responsible for most of the planet's global warming. This is one of the main conclusions of the United Nations third scientific report on climate change'.
	23/01/01 EP	'In light of new evidence and despite uncertainty, most of observed global warming during the last 50 years is due, very likely, to rise in greenhouse concentration in the atmosphere, according to IPCC experts'.

[4] Le Monde did as much, but is excluded from this partial report.

Table 5. Summary of content analysis. Each of the 31 notes identified was read to see if any of the information points from our Decision Grid (Table 2) was included in the coverage, when and from what source. (NYT=The New York Times; EP=El País; LM=Le Monde; LJ=La Jornada; REF=Reforma, EU=El Universal)

Information Point	Date/Newspaper	Source
Time evolution of mean global temperature	19/02/01 LJ	Osvaldo Canziani
	23/01/01 LJ	Unidentified IPCC Report
	18/04/01 REF	'Impacts, Adaptation and Vulnerability' report, 'Scientific basis and Special Report on Emissions Scenarios'.
	23/01/01 EP	No source
	03/04/01 EP	IPCC Third Assessment Report
	18/01/01 NYT	Shangai draft report
	22/01/01 NYT	IPCC report
Alternative hypothesis (Sun, glaciations, volcanism)	18/04/01 REF	No source
Relationship between greenhouse gases and temperatures rise	23/01/01 LJ	Unidentified IPCC Report
	18/04/01 REF	Unidentified IPCC Report
	23/01/01 EP	Unidentified Authors
	18/04/01 REF	Jorge Sánchez Sesma
	23/01/01 EP	IPCC experts
	20/02/01 EP	IPCC experts
	23/01/01 EP	IPCC experts
	19/02/01 EP	James McCarthy
	26/10/00 NYT	'The panel'
	28/10/00 NYT	Most recent IPCC synthesis report
	22/01/01 NYT	Shangai Report
	10/02/01 NYT	First Report
	19/02/01 NYT	First Report
	18/04/01 REF	Report
	23/01/01 LJ	Report
	03/04/01 EP	IPCC Third Assessment Report
	28/10/00 NYT	IPCC
	22/01/01 NYT	Shangai Report
	26/10/00 NYT	Panel members (interviews) / Kevin Trenberth
Anthropogenic origin of greenhouse gases	23/01/01 EP	The authors
	23/01/01 EP	IPCC
	23/01/01 EP	IPCC experts

Temperature projections from greenhouse gas emissions	22/01/01 LJ 18/04/01 RE 23/01/01 EP 19/02/01 EP 03/04/01 EP 26/10/00 NYT 22/01/01 NYT	Unidentified IPCC Report Unidentified IPCC experts James McCarthy James McCarthy IPCC Third Assessment Report Draft report Unidentified IPCC report
Impacts and vulnerability	19/02/01 EP 20/02/01 EU 18/04/01 RE 20/02/01 LJ 20/02/01 EP 19/02/01 NYT 22/02/01 NYT	'A United Nations study' No source 'A thousand pages document'/ Michael Zammit Ernesto Jáuregui / IPCC Report No source 'Impacts, Adaptation and Vulnerability' report Switzerland report
Scale (local /global)	20/02/01 EU 19/02/01 LJ 23/01/01 LJ 18/04/01 RE 23/01/01 EP 19/02/01 EP 20/02/01 EP 20/02/01 EP 03/04/01 EP 19/02/01 NYT 22/02/01 NYT	'A thousand pages document disseminated by the IPCC' 'Some researchers' Report No source 'Impacts, Adaptation and Vulnerability' Report Ohio University/ Greenpeace Studies IPCC Report IPCC Third Assessment Report' Analysis from an influent net of scientists' No source
Adaptation and mitigation	19/02/01 NYT 22/02/01 NYT 19/02/01 LJ 23/01/01 LJ 06/03/01 EP 19/02/01 LJ 10/02/01 NYT 19/02/01 NYT 18/04/01 RE 25/09/01 EP	'Impacts, Adaptation…' report Switzerland report Osvaldo Canziani Klaus Toepfer 'Climate change experts and 100 government representatives'/'An UN speaker' / Group III report Osvaldo Canziani 'A report scheduled for next month' 'Impacts, adaptation and vulnerability' report' 'Most of IPCC researchers' IPCC scientists/ 'A report to be published next October 1'

6. Discussion

The subject of quality in journalism has proven to be a tough nut to crack for both practising journalists and researchers in mass communication, but it seems plausible to argue that in the case of the climate change debate, back in 2001, the public would have been poorly served if at the end of a news cycle lasting roughly one full year the media has failed to recognise that a couple thousand scientists under the umbrella of the most respected organisation in the field

had reached a consensus on the most basic of questions: Yes, global warming is for real, and Yes, we, humankind, have been causing a good portion of it.

Yet our analysis shows that the three Mexican daily newspapers which arguably form the cream of the crop at the national level did just that: they failed to inform their readers about the strongest findings reported by the IPCC up to that moment. Furthermore, the combined total of 4 notes published on climate change by La Jornada, Reforma and El Universal seem to point to a serious difference between them and The New York Times, Le Monde and El País as far as editorial decisions are concerned. The 25 notes found in these foreign newspapers suggest that the Mexican Editors were either unaware of the seriousness of the issues presented by IPCC, or simply unwilling to devote the necessary means to give their readers a good coverage. Or both, indeed, because had it been merely a matter of placing climate change at the lower end of their editorial priorities, the Mexican newspapers would have had the possibility of covering all IPCC Meetings of 2001 with at least wire services and dispatches from news agencies. Instead, none of them had continuity throughout the news cycle, only La Jornada had more than one note during the whole year, and Reforma lagged until the first three meetings had taken place before publishing their first ink on the subject.

But the numbers – telling as they are – fail to touch on the gravest part of the analysis. To say that the coverage was poor because it was scant is not saying nearly enough. What exactly did the Mexican public miss out on? Was there any practical social value attached to the information they did not receive from these three major newspapers? To answer these questions the concept of quality of journalism has to be taken beyond the simple parameters of number and placement of notes. Indeed, it has to be turned into the concept of *functionality*: what good is journalism to its readers, beyond *infotainment* and scandal? What function does it serve in the life of the people it is written for? If we accept the notion presented here that journalism ought to strive to inform the decision processes to which the public, comprised as it is of free citizens, is entitled to, then the social value of the unpublished information should be gauged by its relevance to those very decision processes.

In such case, Table 4 proves that the Mexican newspapers analysed here seriously let down their readers by failing to inform them of the shift in the scientific debate regarding climate change up to 2001. Moreover, Table 5 offers further proof that the Mexican public reading any or all of these three newspapers would have been left ill-informed to decide on matters such as public strategies to mitigate emissions or to adapt, at both local and national scales, to the impacts identified by IPCC as likely or highly likely.

But at the most basic level citizens should have been given the necessary information to make up their minds about the very reality of global warming – for otherwise any discussion on adaptation would appear devoid of any sense – and the human contribution to it – or else the whole point of mitigation might have seem unnecessary. It appears that in Mexico the social

relevance of this information was lost on the very journalists who should have been on the alert for it.

7. Conclusions

We have developed a model of quality in journalism from its social function. By considering potential decisions the public might want to make on issues of interest and relating them to information points necessary to make those decisions, we have found a system in which these decision grids may systematically help journalists to prioritise vast amounts of information so as to guarantee that the coverage will not fail to serve its social function to the public.

Using this system as a diagnostic tool for content analysis we have reviewed the coverage of IPCC's Reports during 2001 in daily newspapers in Mexico and abroad. We found the Mexican dailies to be seriously lacking in relevant information for the Mexican public to have made decisions regarding global warming, its impacts, Mexico's vulnerability, adaptation strategies and available technologies. In contrast, the three foreign newspapers analysed had both broader and deeper coverage, both in terms of number of published notes and the information contained therein, touching on all but one of the information points from our decision grid.

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References

AFP (2001) 'Los científicos prevén un cambio climático incluso si se reducen las emisiones de CO2', *El País,* 25 September.

Agencias (2001) 'Los expertos advierten de que el cambio climático aumentará las sequías en el sur de Europa', *El País,* 19 February.

AP (2001) 'Global warming threat worsening, report says', *The New York Times,* 23 January.

Chanin M.L. and Fellous J.L. (2001) 'L´alteration du climat: une confusion entretenue', *Le Monde,* 16 January.

Crúz-Mena, J. (2002) 'La Ciencia del Periodismo de Ciencia,' in J. Tonda, A.M. Sánchez and N. Chávez (eds) *Antología de la Divulgación de la Ciencia en México*, 103-20. Mexico: UNAM.

DPA (2001) ‘Naciones Unidas alerta sobre el recalentamiento global’, *La Jornada,* 22 January.

Editorial Desk (2000) ‘A sharper warning on warming’, *The New York Times,* 28 October.

El País (2001) ‘La ONU alerta sobre los impactos irreversibles del cambio climático’, *El País,* 14 February.

El País (2001) ‘Las emisiones de CO2 pueden reducirse con la tecnología actual’, *El País,* 6 March.

El País (2001) ‘Sin dudas sobre el calentamiento global’, *El País,* 3 April.

El País (2007) ‘Lluvia de Críticas contra Rajoy por Minimiar el Peligro del Cambio Climático,’ *El País*, URL (consulted November, 2007): http://www.elpais.com/videos/espana/Rajoy/primo/cambio/climatico/elpvidnac/20071023elpepunac_5/Ves/

Ferreira, P. and Barba, A. (2001) ‘La tierra se calienta’, *Reforma,* 19 April.

Galus, C. (2001) ‘Dramatique mise en garde de l’ONU sur le réchauffement’, *Le Monde,* 21 February.

Galus, C. (2001) ‘Les experts évaluent le cout de la stabilisation des émissions de CO2’, *Le Monde,* 7 March.

Herbert, B. (2001) ‘Rising tides’, *The New York Times,* 22 February.

International Reuters, DPA and AFP (2001) ‘Amenaza calentamiento global’, *El Universal,* 20 February.

IPCC (2001a) *Climate Change 2001: The Scientific Basis.* Cambridge: Cambridge University Press.

IPCC (2001b) *Climate Change 2001: Synthesis Report. A contribution of Working Groups I, II and II to the Third Assessment Report of the Intergovernmental Panel on Climate Change.* Cambridge*:* Cambridge University Press.

IPCC (2007) ‘Mandate and Membership of the IPCC,’ URL (consulted November 2007): http://www.ipcc.ch/about/about.htm

Kempf, H. (2000) ‘Les scientifiques prévoient un réchauffement accru du climat’, *Le Monde,* 3 November.

Kovach, B. and Rosenstiel, T. (2001) *The Elements of Journalism: What Newspeople Should Know and the Public Should Expect*. New York: Crown Publishers.

Le Monde (2000) ‘La température de la planète devrait se rèchauffer de 1,5 à 6 grades en 2100, affirment les scientifiques de l’IPCC’, *Le Monde,* 3 November.

Le Monde (2000) ‘Les preuves du réchauffement climatique’, *Le Monde,* 3 November.

Le Monde (2001) ‘Climat: le climat devrait se réchauffer de 1,4 à 5,8 C d´ici á 2100’, *Le Monde,* 24 January.

Le Monde (2001) ‘Le cout humain du réchauffement de la Terre’, *Le Monde,* 21 February.

Mooney, C. (2004) ‘Blinded by Science: How ‘Balanced’ Coverage Lets the Scientific Fringe Hijack Reality,’ *Columbia Journalism Review* (6), URL (consulted November 2007): http://cjrarchives.org/issues/2004/6/mooney-science.asp

Morin H. (2000) ‘Le Xxe siècle a été le plus chaud du millénaire et le XXIe battra ce record’, *Le Monde,* 18 November.

Morin, H. (2001) ‘Dramatique mise en garde de l´ONU sur le réchauffement de la planète’, *Le Monde,* 21 February.

Morin, H. (2001) ‘Le XXIe siècle sera celui des phénomènes climatiques extremes’, *Le Monde,* 27 March.

Núñez, K. (2001) ‘Alerta por el cambio climático’, *La Jornada,* 19 February.

Revkin, A. (2000) ‘A shift stance on global warming theory’, *The New York Times,* 26 October.

Revkin, A. (2001) ‘Global warming’s likely victims’, *The New York Times,* 19 February.

Revkin, A. (2001) ‘Report to back forests to fight warming’, *The New York Times,* 10 February.

Rosen, C. (2008) ‘Analysis of Press Coverage of Climate Change in 2001 from a Functional Model Perspective. Science Journalism in National and Foreign Written Press’. Unpublished Undergraduate Thesis, Faculty of Social and Political Sciences, National Autonomous University of México, and General Direction of Science Communication, UNAM.

Salomone, M. (2001) ‘El nuevo informe del clima culpa a la acción humana’, *El País*, 23 January.

Smith C. (2001) ‘150 nations start groundwork for global warming policies’, *The New York Times,* 18 January.

Vázquez, L. (2001) ‘Los expertos advierten que el cambio climático ya tiene sus primeras víctimas’, *El País,* 20 February.

Authors information

Cecilia Rosen Ferlini (corresponding author)
Reforma, Science Reporter
Email: ana.rosen@reforma.com / cecilia_rosen@yahoo.com.mx
Interests: Coverage of science issues and research on science communication and journalism.

Javier Crúz-Mena
Head, Science Journalism Unit
Office of Science Communication
National Autonomous University of México
Email: cruzmena@universum.unam.mx

Carvalho, Anabela (ed.) (2008) ***Communicating Climate Change: Discourses, Mediations and Perceptions*****.**
Braga: Centro de Estudos de Comunicação e Sociedade, Universidade do Minho
Available from: http://www.lasics.uminho.pt/ojs/index.php/climate_change

6

Newspaper communication on global warming:
Different approaches in the US and the EU?

Astrid Dirikx and Dave Gelders

Abstract

Global warming is one of the major policy challenges for contemporary societies. The construction and implementation of an environmental policy largely depends on public attitudes. Those public attitudes can be influenced by the mass media in several ways. Therefore, exploring the quality of the media coverage on global warming is important. So far content analyses of the communication on climate change have mostly focused on the USA and the UK press. Although the UK coverage has been examined several times, content analyses in other European countries are very sparse. Research of the EU coverage should be broadened, because previous research suggests that there might be differences in the way American and European media report on global climate change. Content analyses in the US press have shown that in many articles the emphasis is on scientific uncertainty. This critical reporting is less prominent in the UK, and in Germany the emphasis is on scientific certainty. On the other hand, the UK press reflects a very alarmist tone when it covers global warming and Germany describes global warming as a 'climate catastrophe', while US newspapers tend to use a more neutral tone. Because these results suggest that there might be differences between US and EU reporting, we argue that more research in Europe is needed and suggest a research method for pursuing it.

Keywords: global warming, climate change, press communication, USA, EU, cultural differences/influences

1. Introduction

From Al Gore's *An Inconvenient Truth*, to the Live Earth Concerts and the reports from the Intergovernmental Panel on Climate Change (IPCC), global warming was everywhere in 2007. Worldwide people are aware of and concerned about climate change (Corbett and Durfee, 2004; Lorenzoni and Pidgeon, 2006). As such, global warming is one of the major policy challenges for contemporary societies.

The construction and implementation of an environmental policy depends for a large part on public attitudes (Palfreman, 2006). A growing number of people state that they are concerned about the environment and the possible consequences of global warming. But several studies have shown that despite this concern, personal and social goals usually take priority over environmental issues. So in most cases the concern for global warming hasn't translated itself into an increase of actual ecological behaviour (Bord, Fisher and O'Connor, 1998; Lorenzoni and Pidgeon, 2006).

This paper will firstly outline that public attitudes on global warming can be influenced by the mass media in several ways. Because of this influence analyses of media-content are important. Therefore, some interesting findings from previous research on the communication on climate change will be discussed in the second part of this paper. Finally, it will be argued that there's need for more research on European press communication on climate change and a research method will be suggested.

2. The role of the media

The mass media can play an important role in influencing people's attitudes towards global warming. First of all there are several studies that argue that most citizens' knowledge on scientific issues is provided by the mass media. Ungar (2000: 308) described science as 'an encoded form of knowledge that requires translation in order to be understood'. It is widely assumed that the mass media play an important role in that translation. One of the most cited sources to support this claim is Dorothy Nelkin. According to Nelkin (1987) people understand science mainly through media coverage and less through experience or education. This is especially the case for issues that do not have any tangible consequences for people (ibid.). The 'dependency theory' of Ball-Rokeach and DeFleur (1976) states that the influence of the media in the construction of meaning is dependent on how readily available meaning-relevant experiences are in people's everyday life. Most people do not have any experience of global warming, so the media can play an important role. Even if a person is confronted with circumstances of extreme heat, floods or drought, he or she will still often depend on the news to link those events to global climate change (Corbett and Durfee, 2005). Thus, the media help to generalize personal experiences and translate science into popular discourse.

Secondly, there have also been found media agenda-setting effects for environmental issues. The theory of agenda-setting states that the salience of an issue in the media has an influence on the importance attached to that issue by the public. It says that maybe the media cannot tell people *what* to think, but can tell people *what to think about* (McCombs and Shaw, 1972). In other words, the media seem to have the power to turn people's attention to global warming. Ader (1995) for example found that the emphasis of the world famous newspaper *The New York Times* on environmental pollution was positively correlated to the importance that

people assigned to that issue from 1970 to 1990. The conclusion of that and other studies was that media help to set the agenda for the public debate on climate change (Ader, 1995; Anderson, Atwater and Salwen, 1985; Gonzenbach and Hester, 1997).

Not only the amount of information that is provided by the media matters. The kind of information or the framing of the information also plays an important role. Entman (1993: 51-52) maintained that: 'To frame is to select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the item described'. As such, McCombs et al. (1997: 6-8) labelled framing as 'second-order-agenda-setting'. Frames implicitly or explicitly emphasize certain aspects of a complex issue. In doing so, frames make it possible for the public to rapidly determine *why* an issue is important, *who* is responsible and *what* might be the consequences. Thus, the way in which the media frame global warming can have an important effect on public understanding of environmental changes and by consequence on the actions that people are willing to undertake.

Finally, the media in general play an important role in the social construction of risks (Douglas and Wildavsky, 1982; Fischhoff, 1995; Slovic, 2000). As noted earlier, the media help to generalize personal experiences. Theories of risk-perception have determined that people's fear of a phenomenon increases with the number of people they believe are exposed to the problem (Fischhoff, Lichtenstein and Slovic, 1980; Ungar, 1992). In addition risk-analysis has shown that the public is most fearful of risks that are unknown, unobservable, and have a high catastrophic potential (Palfreman, 2006). Global warming has all of those characteristics and the media can, by generalizing and framing, easily amplify the fears that people have (Kasperson, Pidgeon and Slovic, 2003). In other words, the media play an important role in the way the public perceive the risk of global climate change.

3. Previous research

So far content analyses of the communication on climate change have mostly focused on the Anglo-Saxon media: the US prestige press and the UK national print press. Those studies resulted in some interesting findings.

'Balance as bias'

First of all, researchers have found that the journalists' urge for balanced reporting can be misleading in the case of global warming coverage. Instead of apportioning weight according to the balance of evidence, equal weight is given to the both sides of an argument. Boykoff and Boykoff (2004) undertook a study of the US prestige press coverage of global warming from 1988 to 2002. They state that there is a clear divergence of popular discourse from scientific discourse and that such a divergence is partly due to journalists' adherence to the principle of

balanced reporting. Firstly, they found that the majority of the US prestige press articles give equal attention to the view that global warming is anthropogenic as to the view that global warming is purely caused by natural fluctuations. That is a form of informational bias because the majority of the scientific community confirms that human actions are contributing to global warming. Secondly, almost eight out of ten articles featured a balanced view on what should be done about climate change. In those articles equal weight was given to the opinion that voluntary actions will suffice as well as to the opinion that mandatory actions are needed. That is a second form of informational bias because there is general scientific consensus that immediate and mandatory actions are necessary (Boykoff and Boykoff, 2004).

The US media's emphasis on scientific uncertainty has been found in several other studies too. Through a content analysis of US popular press articles about global warming from 1986 to 1995, Zehr (2000) found that scientific uncertainty was a salient theme (Zehr, 2000). And Trumbo's (1996) content analysis of five national US newspapers from 1985 until 1995 showed that scientists were ever less used as a news source while non-scientists, like politicians and special interest groups, were cited ever more. That change in the use of sources often led to an overemphasizing of the scientific uncertainty on global warming (Corbett and Durfee, 2005; Gelbspan, 1998). On the other side of the Atlantic, in Britain, the emphasis on scientific uncertainty was found to vary widely between newspapers (Carvalho, 2007).

By balanced reporting the (US) press thus systematically distorts the debate on climate change. A minority of climate skeptics gets the opportunity to proclaim their views and equal weight is given to the opinion of a scientist as to that of a non-scientist. Those opinions are of course far from equal in a scientific debate concerning global warming (Gelbspan, 1998). It is systematically implied that there is no scientific certainty. Balance therefore actually leads to bias. This bias makes it possible for the US government to dismiss responsibility and delay actions until there is more, so-called, certainty (Boykoff and Boykoff, 2004).

That emphasis on uncertainty is not without consequences for public perceptions of climate change. Corbett and Durfee (2004) found that readers of articles that emphasized controversy or uncertainty were less certain of global warming. The inclusion of controversy thus reduced perceptions of certainty. The results did suggest that an inclusion of scientific context may help to tone down the uncertainty, but in many articles that context is still missing (Corbett and Durfee, 2004).

Emphasis on drama

A second interesting finding concerning global warming coverage is that, in general, the media tend to use a discourse that emphasizes drama. McComas and Shanahan (1999) state that news media actively construct narratives about global warming and that in these constructions journalists are primarily led by dramatic considerations. The media not only want

to cover exciting stories, they also want to construct those stories as exciting (McComas and Shanahan, 1999: 35-36). In search for drama, journalists will, as found for example in the US press, focus on conflicts between climate change 'defenders' and climate change skeptics or 'naysayers' (Brossard, McComas and Shanahan, 2004).

Studies in the UK show that the British media take this emphasis on drama a step further than the American press and use an overall overwhelming alarmist tone (Ereaut and Segnit, 2006; Hulme, 2007). Global warming is portrayed as a catastrophic and uncontrollable threat. A recent content analysis by Mike Hulme (2007) in the UK national print press examined the coverage of three Working Group reports of the Intergovernmental Panel on Climate Change. Results showed that alarmist and fatalistic discourses are more dominant than discourses that emphasize agency and empowerment. The language of catastrophe, fear, disaster and death seems to be dominant in British climate change reporting (Hulme, 2007). The media assume that by using that kind of discourse they will draw the attention of the public.

The problem is that dramatic and alarming media portrayals can be very counter-productive in bringing people closer to the problem of global warming and changing their behavior. Stressing conflicts between scientists leads, as mentioned before, to more public uncertainty (Corbett and Durfee, 2004). And an alarmist discourse can have a distancing effect. The 'protection motivation theory' (Rogers, 1983) states that when people are confronted with issues that are threatening but treatable, they will be motivated to change their behavior. But when the threat is bigger than the possibility to do something about it, then that can lead to a rejection of the proposed measures. So, by presenting climate change as an uncontrollable and extreme threat, people may get the impression that the problem is 'just too big to cope with' and that personal actions are not useful (Lowe, 2006; Rogers, 1983). In addition, a study by Cornelissen, Pandelaere and Warlop (2008) found that *positive* cueing of frequently performed ecological behavior – and not scare strategies – increased the amount of ecological choices that people make. Studies have shown that communication strategies based on fear, frequently fail in achieving the desired behavioral outcomes. Instead of bringing people closer to the issue, an alarmist repertoire can in that way distance the public from global warming (Dilling and Moser, 2004; Ereaut and Segnit, 2006).

Importance of ideologies

A third interesting finding from previous research is the role that ideologies seem to play in the reporting on global warming. Carvalho and Burgess (2005) undertook a discourse analysis in three UK broadsheet papers (*The Guardian, The Times, The Independent*) over the period from 1985 to 2003. They found that values and ideological cultures are a key factor in explaining different interpretations of scientific knowledge on climate change by the media. In order to sustain their political preferences, the newspapers emphasize different aspects in the climate

change debate and assign different credibility to the claims-makers. In a later study Carvalho (2007) stated that ideology has implications for the interpretation of facts, that ideology is an important factor in the selection of experts and counter-experts and that the goals associated with knowledge also have an ideological basis.

The importance of ideological standpoints was further underpinned by another study about the UK media by Ereaut and Segnit (2006). In their content analysis of print press, radio, television and the internet, in the years 2005 and 2006, they found that there are several distinct linguistic repertoires on climate change in the UK. They came to the conclusion that certain ideological positions tend to draw on certain repertoires more than others. Overall, the left-leaning press recognizes the problem of global warming and calls for personal actions and innovations to deal with it. The right-leaning press on the other hand covers the problem of climate change, but often minimizes and undermines it with skepticism. Thus, in general we can say that ideologies play a role in the way the issue of climate change is constructed in the press.

4. Need for more European research

In general European governments are less reticent than the American administration about their actions against global climate change. The EU has politically supported and promoted the Kyoto Protocol and the UK has even taken up a leading role. The US on the other hand withdrew from Kyoto in 2001 (Lorenzoni and Pidgeon, 2006). That raises the question if those different political attitudes reflect in different reporting.

Although the UK coverage has been examined several times, content analyses of the media reporting on global warming in other European countries seem to be very sparse. We found some studies in Germany but, overall, European media have been much less analyzed than the American press. Therefore it would be very interesting to study this European coverage more extensively and compare results with those found in the US.

Some differences between the US and the European media coverage on climate change have already been found. As stated earlier, the US press strongly emphasizes the scientific uncertainty concerning global warming. Although that emphasis on uncertainty can be found in some British newspapers as well, Boykoff and Rajan (2007) state that this more critical reporting is less prominent in the UK than in the US (Boykoff and Rajan, 2007; Carvalho, 2007). In Germany, Krauss and von Storch (2005) found that climate skeptics hardly get any attention in the press and that the emphasis is on scientific certainty (Krauss and von Storch, 2005; Carvalho, 2007). Thus, this is a first indication of possible differences in media reporting on global warming between the EU and the US.

There have also been found differences in the tone that is used in covering climate change. It was pointed out earlier that the UK print press is characterized by an alarmist tone. When Mike Hulme (2007) compared the tone of front-page headlines of British and American

newspapers, he found that US newspapers tend to use a more neutral tone than the UK press. Although this was a small-scale study, it suggests that there might be significant differences between the tone that American and European media use in their coverage of global warming. Studies by Engels, Pansegrau and Weingart (2000) and by Krauss and von Storch (2005) in Germany support this assumption. Those two studies found that the German press labels climate change as a 'climate catastrophe' and thus also uses an alarmist tone (Engels, Pansegrau and Weingart, 2000; Krauss and von Storch, 2005).

In sum, because previous research suggests that there are differences between the US and the EU in their reporting on global climate change, it is necessary to analyze the European media more thoroughly. By using similar research questions and similar content analysis instruments as used in previous studies, the possibility of differences between the EU and the US can be analyzed. In addition, the coverage in the different European countries can be compared. Is media coverage in several EU countries similar, or are significant differences likely to be found?

5. Research method

We propose a study that will focus on newspapers from several European countries. In the selection of countries we prefer that the UK and Germany will not be taken into account because several studies there have already been done and the aim is to expand European research. Possible interesting countries could be for example Belgium, The Netherlands and France because content analyses of the communication on climate change in these countries are to date non-existent or very sparse.

In these countries we suggest an analysis of the printed news press. Not only are newspapers a very interesting source of communication on climate change because they usually give more elaborate information than for example television news, but examining the print press also makes an optimal comparison with previous, mostly Anglo-Saxon, content analyses possible. In the selection of newspapers the focus should mainly be on quality newspapers. Elaborate articles with background information and opinion articles are most likely to be found in prestige press newspapers and analyses in that kind of newspapers also make comparisons with most previous research possible. On the other hand, many people do not read quality newspapers and opt for the more popular press. A complete lack of popular newspapers in the analysis therefore does not seem justified. In each country newspapers with different ideological standpoints should be analyzed, because then it will be possible to examine if the results found in the UK (Carvalho and Burgess, 2005; Carvalho, 2007; Ereaut and Segnit, 2006) are also found in other European countries.

The lapse of time covered by the articles would ideally be the last two decades. The starting point could be 1985, the year in which the ozone hole was discovered and the year in which one

of the first crucial scientific meetings in the field of climate change was held in Villach, Austria and the analysis could run up to 2007. Bearing in mind the limited time there usually is to do analyses, examining twenty years of media coverage on climate change in three countries may be too much. Therefore we suggest to start the analysis in 2007 and work backwards from then on. That way it will definitely be known how the recent media coverage on climate change looks and there is no risk of having to stop the analysis in for example 1995, without knowing how climate change has been covered in the last few years.

The content analysis should focus on four main questions:

1. Is there 'balance as bias' in the European newspapers? Is emphasis placed on controversy and scientific uncertainty or do climate sceptics get relatively little attention? To examine this the content analysis measures of Boykoff and Boykoff (2004) could be used. They distinguished two content analysis measures to examine balance as bias in the coverage of the debate over anthropogenic contributions to global warming and in the coverage of decisions regarding action against global warming.

2. In which ways is climate change framed? For example: is the human interest side of the issue emphasized, or is the focus on what might be the consequences of global warming? To examine this the frames that were distinguished by De Vreese, Semetko and Valkenburg (1999) could be used. They found that five frames constantly re-occur in newspaper coverage: a conflict frame, a human interest frame, a responsibility frame, a consequences frame and a morality frame. By using the coding measures of De Vreese et al. it could be examined which frames are mostly used in covering climate change.

We conducted this kind of deductive frame-analysis on quality newspapers in France and the Netherlands (Dirikx and Gelders, accepted/in press). The results showed that the most frequently used framing methods were the consequences frame and the responsibility frame. Many of the articles made reference to the consequences of the (non-)pursuit of a certain course of action and of possible losses and gains (consequences frame). Additionally, a large number of the articles mentioned the need for urgent actions, referenced possible solutions and suggested that certain levels of government are responsible for and/or capable of alleviating climate change problems (responsibility frame). These findings are in accordance with our earlier suggestion that the European media focus on the scientific certainty concerning anthropogenic climate change and the need for mandatory actions.

An additional research question could be which themes are most prominent. The themes that were distinguished by McComas and Shanahan (1999) in their study *Telling stories about global climate change* can be used as a starting point.

3. What is the tone of the reporting? Do the articles reflect an alarmist or a more neutral tone? For each article it could be analyzed which linguistic repertoire of those distinguished by Ereaut and Segnit (2006) it reflects. They found twelve repertoires that can be combined into three main groups: the 'alarmist discourse' that uses the language of fear and disaster, the 'optimistic discourses' that reflect a tone of 'everything is going to be alright' and the 'pragmatic optimistic discourses' that have an underlying tone of 'everything is going to be alright, as long as we do something about it'.

4. Do different ideological standpoints reflect in different reporting? Do the left-leaning and the right-leaning press frame their articles about global warming in a different way? Do they use a different tone?

Apart from those four main issues, morphological characteristics and structural organization of the articles like size, page number, section and headlines, could also be analyzed.

By means of such content analyses we hope to shed some more light on European climate change reporting and analyze potential differences in reporting between the EU and the US, and amongst European states.

References

Ader, C. R. (1995) 'A Longitudinal Study of Agenda Setting for the Issue of Environmental Pollution', *Journalism and Mass Communication Quarterly* 72(2): 300-11.

Anderson, R. B., Atwater, T. and Salwen, M. B. (1985) 'Media Agenda-setting with Environmental Issues', *Journalism Quarterly* 62(2): 393-97.

Ball-Rokeach, S. and DeFleur, M. (1976) 'A Dependency Model of Mass Media Effects', *Communication Research* 3: 10-21.

Bord, R. J., Fisher, A. and O'Connor, R. E. (1998) 'Public Perceptions of Global Warming: United States and International Perspectives', *Climate Research* 11: 75-84.

Boykoff, J. M. and Boykoff, M. T. (2004) 'Balance as Bias: Global Warming and the US Prestige Press', *Global Environmental Change – Human and Policy Dimensions* 14(2): 125-36.

Boykoff, M. T. and Rajan, S. R. (2007) 'Signals and Noise. Mass Media Coverage of Climate Change in the USA and the UK', *European Molecular Biology Organisation Reports* 8(3): 207-11.

Brossard, D., McComas, K. and Shanahan, J. (2004) 'Are Issue-cycles Culturally Constructed? A Comparison of French and American Coverage of Global Climate Change', *Mass Communication and Society* 7(3): 359-77.

Burgess, J. and Carvalho, A. (2005) 'Cultural Circuits of Climate Change in U.K. Broadsheet Newspapers, 1985-2003', *Risk Analysis* 25(6): 1457-69.

Carvalho, A. (2007) 'Ideological Cultures and Media Discourses on Scientific Knowledge: Re-reading News on Climate Change', *Public Understanding of Science* 16(2): 223-43.

Corbett, J. B. and Durfee, J. L. (2004) 'Testing Public (Un)certainty of Science. Media Representations of Global Warming', *Science Communication* 26(2): 129-51.

Corbett, J. B. and Durfee, J. L. (2005) 'Context and Controversy: Global Warming Coverage', *Nieman Reports* 59(4): 88-89.

Cornelissen, G., Pandelaere, M. and Warlop, L. (2008) 'Positive Cueing: Promoting Sustainable Consumer Behavior by Cueing Common Environmental Behaviors as Environmental'. *International Journal of Research in Marketing* 25(1): 46-55.

Dilling, L. and Moser, S. C. (2004) 'Making Climate Hot: Communicating the Urgency and Challenge of Global Climate Change', *Environment* 46(10): 32-46.

Dirikx, A. and Gelders, D. (accepted/in press) 'Global Warming Through a Same Lens: an Explorative Framing Study in Dutch and French Newspapers', in T. Boyce and Lewis, J. (eds.) Media and Climate Change. Oxford: Peter Lang.

Douglas, M. and Wildavsky, A. (1982) *Risk and Culture*. Cambridge: MIT Press.

Engels, A., Pansegrau, P. and Weingart, P. (2000) 'Risks of Communication: Discourses on Climate Change in Science, Politics and the Mass Media', *Public Understanding of Science* 9(3): 261-83.

Entman, R. M. (1993) 'Framing: Toward Clarification of a Fractured Paradigm', *Journal of Communication* 43(4): 51-58.

Ereaut, G. and Segnit, N. (2006) 'Warm Words. How Are We Telling the Climate Story and Can We Tell it Better?' Institute for Public Policy Research Papers. London: Institute for Public Policy Research.

Fischhoff, B., Lichtenstein, S. and Slovic, P. (1980) 'Facts and Fears: Understanding Perceived Risk', in W. Albers and R. Schwing (eds.) *Societal Risk Assessment: How Safe is Safe Enough?*, 181-14. New York: Plenum Press.

Fischhoff, B. (1995) 'Risk Perception and Communication Unplugged – 20 Years of Process', *Risk Analysis* 15(2): 137-45.

Gelbspan, R. (1998) *The Heat Is On: the Climate Crisis, the Cover-up, the Prescription*. Cambridge, Massachusetts: Perseus Press.

Gonzenbach, W. and Hester, J. (1997) 'The Environment: TV News, Real World Cues, and Public Opinion over Time', *Mass Communication Review* 22(1/2): 5-20.

Kasperson, R. K., Pidgeon, N. F. and Slovic, O. (eds.) (2003) *The Social Amplification of Risk*. Cambridge: Cambridge University Press.

Krauss, W. and von Storch, H. (2005) 'Culture Contributes to Perceptions of Climate Change', *Nieman Reports* 59(4): 99-102.

Lorenzoni, I. and Pidgeon, N. F. (2006) 'Public Views on Climate Change: European and USA Perspectives', *Climate Change* 77: 73-95.

Lowe, T. D. (2006) 'Is This Climate Porn? How Does Climate Change Communication Affect Our Perceptions and Behaviour?' Tyndall Working Paper. Norwich: Tyndall Centre for Climate Change Research, University of East Anglia.

McComas, K. and Shanahan, J. (1999) 'Telling Stories about Global Climate Change. Measuring the Impact of Narratives on Issue Cycles', *Communication Research* 26(1): 30-57.

McCombs, M. E. and Shaw, D. L. (1972) 'The Agenda-setting Function of Mass Media', *Public Opinion Quarterly* 36(2): 176-87.

McCombs, M. E., Shaw, D. L. and Weaver, D. (1997) *Communication and Democracy: Exploring the Intellectual Frontiers in Agenda-setting Theory*. Mahwah New Jersey: Lawrence Erlbaum Associates.

Nelkin, D. (1987) *Selling Science*. New York: Freeman.

Palfreman, J. (2006) 'A Tale of Two Fears: Exploring Media Depictions of Nuclear Power and Global Warming', *Review of Policy Research* 23(1): 23-43.

Rogers, R. W. (1983) 'Cognitive and Psychological Processes in Fear Appeals and Attitude Change: a Revised Theory of Protection Motivation', in Cacioppo, J. T and Petty, R.E. (eds.) *Social Psychophysiology: A Sourcebook*, 153-77. New York: Guilford.

Slovic, P. (2000) *The Perception of Risk*. London: Earthscan.

Trumbo, C. (1996) 'Constructing Climate Change: Claims and Frames in U.S. News Coverage of an Environmental Issue', *Public Understanding of Science* 5(3): 269-83.

Ungar, S. (1992) 'The Rise and (Relative) Decline of Global Warming as a Social Problem', *The Sociological Quarterly* 33(4): 483-501.

Ungar, S. (2000) 'Knowledge, Ignorance and the Popular Culture: Climate Change versus the Ozone Hole', *Public Understanding of Science* 9(3): 297-312.

Zehr, S. C. (2000) 'Public Representations of Scientific Uncertainty about Global Climate Change', *Public Understanding of Science* 9(2): 85-103.

Authors information

Astrid Dirikx (corresponding author)
Research Assistant of the Fund for Scientific Research-Flanders
K.U.Leuven, Faculty of Social Sciences, Leuven School for Mass Communication Research, Parkstraat 45 bus 3603, BE 3000 Leuven, Belgium
Email: astrid.dirikx@soc.kuleuven.be

Prof. dr. Dave Gelders
K.U.Leuven, Faculty of Social Sciences, Leuven School for Mass Communication Research, Public Management Institute, Parkstraat 45 bus 3603, BE 3000 Leuven, Belgium
Email: dave.gelders@soc.kuleuven.be

Carvalho, Anabela (ed.) (2008) ***Communicating Climate Change: Discourses, Mediations and Perceptions*****.**
Braga: Centro de Estudos de Comunicação e Sociedade, Universidade do Minho
Available from: http://www.lasics.uminho.pt/ojs/index.php/climate_change

5

The role of culture in climate change policy making:
Appealing to universal motivators to address a universal crisis

Judy M. Ford

Abstract
Climate change poses the first universal crisis of our planet; an urgent crisis, which demands urgent and universal policy. This paper analyzes both the universalist theory, which underlies universal policy, as well as the concepts of culture and cultural difference, which have been used to subvert prior universal policy, namely the Universal Declaration of Human Rights and Vienna Declaration.

Keywords: climate change, culture, universalism, policy

1. Introduction

> 'in the first decade of the new millennium, humanity…is more globally united and interconnected, more sensitized to the experiences and suffering of others…more conscious of alternative future possibilities and ideals, more capable of collective healing and compassion, and, aided by technological advances in communication media, more able to think, feel, and respond together in a spiritually evolved manner to the world's swiftly changing realities than has ever before been possible.'
> - Richard Tarnas, Natural Capital Institute (2007)

Climate change poses the first universal crisis of our planet. The natural world recognizes none of man's arbitrary national borders, trade pact zones, or gated communities and affects all humans in an unpredictable manner. It is an urgent and universal crisis that demands an urgent and universal policy.

But is universal policy possible in a world divided by cultural differences? Prior efforts, most notably the Universal Declaration of Human Rights in 1948 and Vienna Declaration in 1993 (herein referred to collectively as UDHR), have failed in the sense of a 'universal policy' as individual governments have been allowed to interpret and implement human rights to accommodate 'cultural differences'.

But how big are these differences? Are these differences more salient than any set of universal principals shared by all people? Or is cultural difference too often evoked to mask

economic, political and other interests, knowing that others cannot dispute it without being judged ignorant or insensitive?

To look at the possibility of creating universal policy to address climate change, this paper will explore the role of culture in climate change policy making, looking at concepts of culture, cultural difference, universalism, and policy making, as well as the role that mythology, the media and our connected online world play in shaping our ability to construct a universal policy such as is needed to address a universal crisis of the scale of climate change.

2. Concepts of culture, relativity, and universalism

Of all the words in our language, none provokes more imagery, and misunderstanding, than 'culture'. The term 'culture' is commonly used in many ways, which roughly fall into two categories:

1. Visual and performing art, music, or people deemed more knowledgeable or superior by comparison to their counterparts (e.g., the 'high culture' opera audience looking down their Galilean binoculars at the masses of 'low culture' eagerly anticipating Domino Day; Wijers, 2007).
2. Anthropological studies of the audio and visual arts and behavior of an 'exotic other' (e.g., National Geographic magazine articles of half-naked, paint-covered bodies, indigenous crafts and ritual dances), which expose the anthropological frame of most cultural studies to date, a frame biased by its roots in colonialism. It assumes that culture is a set of characteristics held by exotic other peoples, which we – the norm – do not possess (Ashcroft et al., 1998).

However, if we look at actual definitions of culture, versus the way culture is spoken of, we find the broader definitions favored by communication scientists. Here, culture is defined both as 'a set of shared attitudes, values, goals, and practices that characterize an institution, organization, field, activity, or society' (Merriam-Webster, 2007) and 'a comprehensive concept covering all the symbolic and material expressions in words, gestures, images and sounds that people derive an identity from and use in their efforts to distinguish themselves from others' (Universiteit van Amsterdam, 2006: 11).

These definitions view culture as a set of ideas and behaviors that define a group of people, whether by gender, ethnicity, nationality, mother tongue, occupation, age, sports, hobbies, and/or even a passing phase. By this definition, no two humans are members of all and only the same cultural groups (Singer, 2000: 28).

With membership in a cultural group comes identification with that culture. Identification may play out in a recognized dress code, mode of speaking, participation in certain rites, etc. These

outwards symbols and behaviors are as much to show camaraderie and solidarity with other members of the group as they are signals to outsiders and 'opposing groups'. Throughout our lives, the relative importance of each identity is dependent upon the situation at hand. Some may remain in the background our entire lives, only to spring forward in sudden importance upon changing circumstances. 'Individuals carry multiple identities, which form their own universally unique whole' (Hamelink, 2006).

The United Nations (2004: 4) Human Development Report of 2004 'Cultural Liberty', states, 'culture is not a frozen set of values and practices. It is constantly recreated as people question, adapt and redefine their values and practices to changing realities and exchanges of ideas.'

So not only is each individual a member of a unique set of multiple cultural groups, but the cultural practices and values of each of these groups are constantly changing. This dynamic reality is a far cry from the static anthropological and class-based ways that ideas of culture are most often invoked. Culture is not intrinsic or genetic, but something learned and judged through nurture. Research on adopted children, who grow up in a land other than their land of origin, and studies of differences between identical twins provide further evidence (Singer, 1987). In practice, however, culture is often referred to a pattern of behavior that is inborn and, therefore, unavoidable and unchangeable.

Cultural difference

If we look at concepts of cultural difference, we again see anthropologically-biased, group-oriented cultural studies, such Values Orientation Theory (Kluckhohn and Strodtbeck, 1961), and Hofstede's (2001) well-known organizational research, which attempted to quantitatively classify whole nations[1] along linear and absolute dimensions of beliefs, such as power, self, gender, predictability, and time. As conflict transformation expert, Michelle LeBaron (2003: 1) points out, 'any generalization will apply to *some* members of a group *some* of the time'. The challenge, and danger, of course, is in understanding 'who?' and 'when?' 'some' are. While these studies fit everyone in clean, little boxes and may be helpful for understanding broad cultural differences to some extent on a macro level, these theories ignore the immense complexity inherent in unique individuals and risk predestinating outcomes and the stereotyping associated with ethnocentricity.

In an attempt to avoid conflicts and misunderstandings based on cultural differences, an entire 'Intercultural Communications' industry has blossomed, filled with academic and commercial training, seminars, and 'Do and Taboo'-type books. Unfortunately, the more we hear about cultural difference, the more different we think we are and the more likely we are to assume that misunderstandings are cultural, and therefore, inherent, and therefore, unsolvable. The more likely we are to throw our hands in the air, call 'cultural difference' and walk away. The

[1] Geert Hofstede (2007) classifies the entire Arab World and West Africa as homogenous blocks.

intercultural communications industry can actual leave its students feeling *less* at ease with the culture they will encounter than they would have without the 'training' and risk reinforcing and/or creating stereotypes by assigning a standard behavior to a large group of individuals (Undutchables, 2008).

If we return again to the actual definition of culture as 'the set of shared attitudes, values, goals, and practices that characterize an institution, organization, field, activity, or society' (Merriam-Webster, 2007), than cultural differences could be defined as 'differences in shared attitudes, values, goals, and practices between societies'. These differences in shared attitudes, values, goals, and practices are learned *from* our societies. Some carry deeper cultural significance than others, but many are simply practices that have no deeper significance, although these differences can cost multinational organizations time, money and embarrassment when they get it wrong.

Ethnocentrism

Our tendency to see our way as natural and correct and to fear/ loathe/ distrust different ways as unnatural and incorrect is often referred to as ethnocentricity. One of the most noticeable displays of ethnocentricity can be seen in the current discussions in historically Christian Western communities that are struggling to 'integrate' non-native ethnicities, especially those of Muslim faith. The latter accuses the former of not accepting 'Western values' of equality and freedom, while the former remain appalled by the lack of values in Western societies reflected in high rates of violence, promiscuity, and divorce, along with a perceived lack of respect towards elders and the community. Each group remains convinced that the other lacks values and plays into the set of 'universal' stereotypes identified in the 1970s by anthropologist, Robert LeVine, and psychologist, Donald Campbell (1972: 173). Blaming 'cultural differences' between the 'native' and the 'newcomers', based not on how long a family has been in the country, but largely on the color of their skin and religious beliefs, is easier than addressing the very realistic fears of increasing economic disparity, decreasing congregations in the native's own faiths, and lack of space and opportunity.

Stereotyping

Stereotypes are widely held beliefs about a definable group, which is caused by a combination of tension between diverse groups, negative experiences, inequalities, perceived threats and repetitive images used in the media. Over time, stereotypes can become a widely-accepted 'cultural truth', even in the face of multiple deviances. The stereotype becomes something to challenge, fight or disprove for members of these cultures instead of being judged on their individual behavior. We look for incidences which support the stereotype and tend to ignore incidences that contradict it (Burgess, 2003).

One of the original designers of Epcot Center, a permanent world fair located in Orlando, Florida, observed that visitors to the country pavilions typically disliked their 'own' country pavilion, while enjoying the others (personal communication). He hypothesized this happened because the country pavilions played to common stereotypes (e.g., German beer halls, Japanese pagodas, and Mexican Mariachi bands), which confirmed the stereotypes visitors hold of these countries. Yet, most visitors resented seeing their own country defined by its stereotypes, because they see they own country as naturally more complex.

It is nearly impossible to find a 'typical' anyone because there will always be an exception for the uniqueness inherent in an individual. As we look harder at what makes the so-and-so so typical, we realize that those characteristics also describe other cultures and are, therefore, not unique to them. As language expert, Abraam de Swaan (2006) always reminds us, 'precisely what makes us feel so unique may be the precise things we have in common with every other group.'

Even among studies of individual behavior within multi-cultural organizations (Gardenswartz et al, 2003), 'personal values accounted for a large proportion of individual variation in readiness for contact with others from a different group' (Connerley and Pedersen, 2005: 44). Even Clyde Kluckhohn, one of the creators of the Values Orientation Theory (Kluckhohn and Strodtbeck, 1961), ultimately concluded that, 'despite wide differences in customs, there are apparently fundamental human values common to the diverse cultures of the world.' (Parsons and Vogt, 1962: 141).

Identity politics

Unfortunately, religious and ethnic groups have often been pitted against one another in the name of cultural differences to mask economic and political interests, avoid unpopular policy requirements (e.g., human rights and environmental responsibility), and justify discrimination against a particular group (e.g., gender, ethnicity, religion, age), knowing that others cannot dispute them without fear of being judged ignorant or insensitive. 'Identity politics' have been used by members of one ethnicity, religion, etc. to call attention to their own uniqueness, thereby creating dividing lines between themselves and 'the other side'. However according to the UNHDR 'Cultural Liberty Report' (United Nations, 2004: 3):

> 'there is little empirical evidence that cultural differences and clashes over values are in themselves a cause of violent conflict. (While)…violent conflicts have arisen… (primarily)… between ethnic groups…there is wide agreement…by scholars that cultural differences by themselves are not the relevant factor. Some…argue…cultural diversity reduces the risk of conflict by making group mobilization more difficult…Wars (are caused by)… economic inequalities,… struggles over political power, land and other economic assets. Cultural identity… (is not)…a cause but…a driver for political mobilization. Leaders invoke a single identity, its symbols and its history of grievances, to 'rally the troops'. It is not rare for groups to be dominated by people who have an interest in maintaining the status quo under the

justification of 'tradition' and who act as gatekeepers of traditionalism to freeze their cultures.'

Genocide typically starts when one identity (e.g., religion, ethnicity) dominates and minimizes the relevance of other identities. By focusing on this one identity, individuals become 'de-humanized' members of contrasting groups and can therefore collectively labeled as evil. By removing the individual human faces on members of this contrasting group, the members all merge into one homogeneous, two-dimensional face which is easier to dislike and distrust. Identity development plays an especially strong role in the first three stages of genocide – Classification, Symbolization, Dehumanization identified by Gregory Stanton (Genocide Watch, 1998). It is this inherent and inevitable concept of cultural identity and violence, which Nobel Prize-winning economist, Amartya Sen (2006), recently outlined. He argues that cultural identity-based violence is not inevitable and uses the manipulated brutality between Hindus, Sikhs and Muslims during the partitioning of British India as a quintessential example of identity politics in action.

More recently, the Western propaganda leading up to the American-led invasion of Iraq fed on identity politics of Samuel Huntington's (1993) Clash of Civilizations. Its discussion of a cultural war, a war of civilizations, and a defending of democracy, helped to justify a Christian Crusade-like march into 'Muslim incivility'. Iraqis were alternatively mentioned as both terrorists and victims in need of liberation. However, as Reda Benkirane (2002: 2) of the Ecumenical Advocacy Alliance eloquently states:

> 'the problem with the application of Huntington's theory in the current context is that cultures and civilizations are now portrayed as playing the roles that nation-states played during the Cold War. Cultures and civilizations are seen as monolithic blocs acting on the geopolitical scene rather than as living and evolving organisms that need constantly to exchange and interact with their environment. Furthermore, the clashes Huntington classified as timeless[2] are more often camouflage for economic and political aspirations by local, regional and international power brokers.'

And, as Sen (2006: xvii) emphasizes, 'the prospects of peace in the contemporary world may well lie in the recognition of the plurality of our affiliations and in the use of reasoning as common inhabitants of a wide world'.

Political uses of cultural relativism

Cultural relativists still argue, though, that 'the concept of human rights is really a cover for Western interventionism in the affairs of the developing world, and that 'human rights' are merely an instrument of Western political neocolonialism' (Tharoor, 1999/2000: 2). It is from this basis that Asian Values' proponents, who helped engineer the Bangkok Declaration, claim that

[2] Huntington (1993: 25) emphasized that the 'conflicts of the future will occur along cultural fault lines separating…seven or eight major civilizations… (Western, Confucian, Japanese, Islamic, Hindu, Slavic-Orthodox, Latin American and possibly African civilization)'.

the ‘communitarian, Confucian and Buddhist Asian’ is focused on social, economic and cultural rights while the ‘individualistic, Christian Westerner’ is focused on civil and political rights. ‘Asian Values’ proponents do not question international legal human rights documents as such; they question the emphasis by Western countries on civil and political rights.

However, they call more often to their ‘national identities in accordance with the ideals and aspirations of their peoples…’ (ASEAN, 1993: 1)[3] as opposed to specific fundamentally different cultural values (Steiner, 2005). The need for governments to stabilize their political powers by meeting people’s basic needs can be found throughout history and government. It is on this precedent that ‘Asian Values’ proponents argue that they prioritize a certain set of rights. ‘Objections to the applicability of international human rights standards have all too frequently been voiced by authoritarian rulers and power elites to rationalize their violations of human rights—violations that serve primarily, if not solely, to sustain them in power’ (Tharoor, 1999/2000: 5). According to Kim Dae-jung (1994: 2), former South Korean President and Nobel Peace Prize Recipient, ’Asia has a rich heritage of democracy-oriented philosophies and traditions…the biggest obstacle is not its cultural heritage but the resistance of authoritarian rulers and their apologists…it is widely accepted that English political philosopher John Locke laid the foundation for modern democracy. But almost two millennia before Locke, Chinese philosopher Meng-tzu preached similar ideas’.

However, in 1990 the Cairo Declaration of Human Rights in Islam (CDHRI), created during the Organization of the Islamic Conference, asserted that because the UDHR was a ‘western secular concept of Judeo-Christian origin, (it was) incompatible with the sacred Islamic shari'a’ (Littman 1999: 1). Under the more extreme implementations of Sharia law, Muslim men have twice the power in a court than a woman or a non-Muslim man. However, the Prophet Muhammad created the Constitution of Medina (*Sahifat al-Madinah*), which was ‘based on tolerance, equality and justice...many centuries before such an idea existed anywhere else in the world (Sajid, 2004: 1).

Ultimately, ‘there does not need to be any trade-off between respect for cultural difference and human rights and development’ (United Nations, 2004: 4).

2. Universalism[4]

> ‘The crucial task is to fundamentally strengthen a system of universally shared moral standards that will make it impossible, on a truly, global scale, for the various rules to be time and again circumvented with still more ingenuity than had gone into their invention.

[3] The exact wording vis-à-vis universalism is ‘while human rights are universal in nature, they must be considered in the context of a dynamic and evolving process of international norm-setting, bearing in mind the significance of national and regional particularities and various historical, cultural and religious backgrounds.’

[4] For the purposes of this paper, I refer to the philosophical understanding of universalism to mean the belief that universal facts can be discovered, in opposition to relativism, such as those which underpin the Universal Declaration of Human Rights.

> Such standards will truly guarantee the weight of the rules and will generate natural respect for them in the societal climate.'
> - Vaclav Havel (2000: 4)

> 'When have you heard a free voice demand an end to freedom? Where have you heard a slave argue for slavery? When have you heard a victim of torture endorse the ways of the torturer? Where have you heard the tolerant cry out for intolerance?'
> - Kofi Annan (1997)

Universalist concepts have existed since the ancient Greeks, but universalism is often considered an Enlightenment concept (Hall, 1979; West, 1993; Wood, 1991). Universalists assert that beneath cultural differences, all humans share core philosophical common denominators (Maleuvre, 2004), ground ideas (Campbell, 1991), human identity (Littman, 1999), archetypes (Jung, 1934-1954), human nature (Wilson, 1978) and contend that universal truths can be identified. They claim there are experiences, longings, and needs that might unite human beings, *regardless* of any cultural, gender, or religious differences.

Universalism does not claim that we are all the same, nor does it refute that differences exist. The studies of these differences are important for effective international business and affairs. It is a disagreement about the extent to which differences, rather than universal principles, should be emphasized. Universalism has been understudied in the past primarily because cultural studies are typically based in either the anthropology field, which by its nature focuses on the unique patterns found in micro-slices of a specific culture and geography, or international relations, which focuses on state-based national differences. As E.O. Wilson (1999) claims, the study of human nature requires a cross-disciplinary study which crosses into communications, sociology, psychology, socio-cultural anthropology, political science, literature, theater and international relations.

So, despite its vulnerability to claims of post-colonialism, researchers like Didier Maleuvre (2004: 134) claim:

> 'the bias against any homogeneity…is…misguided, since it is on the basis of this assumption of universal dignity that respect for differences is claimed. Dignity is bestowed because I see, beneath the patchwork of culture, the human being — a human being whom I recognize as being like me…Concepts of justice and law, the legitimacy of government, the dignity of the individual, protection from oppressive or arbitrary rule, and participation in the affairs of the community are found in every society on the face of this earth…Tolerance and mercy have always, and in all cultures, been ideals of government rule and human behavior.'

Universalism is not simply the art of learning to 'delight in our differences', as Archbishop Desmond Tutu has said (United Nations, 2004: v). It is reaching deeper to find universal connections that supersede the differences and appealing to them. Anthropologists can continue to study nuances of tribes, and we can continue to celebrate diversity, but if too much emphasis is placed on the differences, we risk losing sight of the similarities. We must

understand the economic, personal and political interests behind cries of cultural differences, without fear of being judged ignorant or insensitive.

Universalism embraced

The idea of universal principals was embraced long ago by religious, activist, media and commercial organizations and underpins the Universal Declaration of Human Rights and the very concept of the United Nations; from missionaries preaching their gospels and activist petitioning for greater representation to movies geared to our inner hero and 'glocal' marketing campaigns 'communicat(ing) in many languages but with one voice' (Interbrand, 2005a: 4). However, evidence of its existence goes back to the earliest myths created by man to explain the world view of a people (Campbell and Moyers, 1991). According to the pioneer of modern comparative mythology, Joseph Campbell, all mythology around the world and throughout the ages has been based upon the same universal, timeless and transcending themes or 'ground ideas' that proved that the human psyche, regardless of sex, nationality, or culture, craved basic ideas around which the world could be understood (Campbell and Moyers, 1991). They help us understand the mysteries of life, the coming of age, and death; our relationship with the spiritual world, nature, and each other; and the hero's journey, which 'serves as a template for life's major initiations – birth, coming of age, finding a partner and raising a family, growing old and dying' (Gerringer, 2006: 19).

Campbell argued that our physical environment and time in history shape the details of the myths we create, and that clashes between cultures are found in these details, not in the transcending themes underlying them. In the great Indian epic, Mahabharata, written more than 2000 years ago, the great rishi, Bharadvaja, argued against the traditional caste system with the question 'how…(can)…we have caste differences… (when)…we all seem to be affected by desire, anger, fear, sorrow, worry, hunger, and labour (Sen, 2005: 3-4)?

Campbell began with Carl Jung's (1968: 8 & 43, *paraphrased*) archetypes, the 'collective, universal, eternal, inherited and unconscious images identical in all humans', as a way of explaining why similar images reoccur in myths of completely different cultures. We see these images repeatedly in our dreams, which explains 'why myths and most stories constructed on the mythological model have the ring of psychological truth…(and)…accounts for the universal power of such stories' (Vogler, 1998: 15). The planning group for a new museum on mythology chose to focus on death as a key entry point for the exhibits because 'all questions are rooted in death' (Harness, 2007).

Universalism in the media

Storytelling still often follows the ancient patterns of the mythical heroes journey, and not coincidentally, the most successful films (e.g., Star Wars, Indiana Jones, Harry Potter, ET, and

The Lord of the Rings) both within the U.S. home market of Hollywood (Movie Web, 2007a and 2007b), as well as outside the U.S. (IMDB, 2007), reflect this theme. According to Christopher Vogler (1998: 10), story analyst of the Walt Disney Company:

> 'the pattern of the Hero's Journey is universal, occurring in every culture, every time. It is as infinitely varied as the human race itself and yet its basic form remains constant…stories built on the model of the Hero's Journey have an appeal that can be felt by everyone, because they deal with the childlike universal questions: Who am I? Where did I come from? Where will I go when I die? What is good and what is evil? What must I do about it? What will tomorrow be like? Where did yesterday go? Is there anybody else out there?'

Even the highest grossing films made outside of Hollywood's global distribution reach: Wo hu cang long (Crouching Tiger, Hidden Dragon), La Vita è Bella (Life is Beautiful), and Ying xiong (Hero) (Kaufman, 2004; Lists of Bests, 2007; Film Fest, 2004) have been either martial arts fantasies or stories of unusual heroes, which appeal to these elements. Crouching Tiger is:

> 'putatively set in 19th century China, but it could be anywhere, any when. It is a place of high honor and deep feelings, a place where people are bound by traditions and held captive by their forms. It is also a place of wild and mythic landscapes...from stark desert…to magic misty green mountains with deep dark lakes and steeply cascading streams that come braiding, tumbling down the rockslide heights. High, reedy bamboo forests wave, wondrous, in sighing winds…apart from all else, this is grand storytelling! It has passion, love, revenge...it expresses deep need and longing..' (Santoro, 2001)

Research on international television programming has found that violence, sex, heartbreak (e.g., soaps), body humor (e.g., Mr. Bean) and basic humor (e.g., Friends, Nanny, Cosby, Bundy, Sex in the City, Simpsons, South Park) export well because they are simple to translate and play to universally-empathetic and recognized characters and themes (Kuipers, 2007).

Universalism and cross-border interests

Some cultural groups cross traditional ethnic and national borders, such as expats, deaf people, professionals in almost any field (Rotary Club, 2007), athletes, and elites (aSmallWorld, 2007), as well as more harmful groups, such as pedophiles and racists. While individual academics attending an international conference will display any number of obvious signs of cultural difference, at the core, each attends the conferences and writes papers in order to present their work, which follows a common set of principles and rules, and be judged by their peers.

Part of what fuels the connect-ability of these groups is the ability to find each other. Since the usage of email and the Internet has exploded in the past fifteen years, social scientists have noted several communications techniques spawned by this technology – blogs, email chain letters, online petitioning, instant messaging, and video sharing – that break traditional

boundaries. The Internet allows kindred souls to organize around their causes and essentially broadens the geographic reach of the 'public sphere' (Habermas, 1991).

When Amnesty International (2007) wants to petition for the release of political prisoners around the world or the National Resource Defense Council (2007) wants to protest a potentially harmful dam in Chile, Internet activism provides information dissemination, petitioning, and fundraising opportunities. The recent uprising in Burma was fueled by online bloggers (YouTube, 2007) and digital camera mobile phone users updating the outside world. When the Burmese government wanted to close its borders, it first shut down the Internet providers, a measure as effective as a physical closure of airports or checkpoints (Mydans, 2007).

The environmental movement in particular has strengthened the embrace what one reviewer of the recently published One Planet book from Lonely Planet (2004: cover sleeve) called a 'celebration of…the connections and similarities that exist within…diversity… unifying moments in our superficially divided one and only planet.'

Universalism in commerce

According to Interbrand, one of the top brand management firms in the world:

> 'brands are…central to…democratic societies. They…have a profound impact on…the way we see our world (2005b)…(They) symbolize a promise that people believe can be delivered and one they desire to be part of. Through emotion, brands can achieve the loyalty of consumers by tapping into human values and aspirations that cut across cultural differences. Global brands (transcend borders), act as ambassadors for nations and capture the spirit of an age'. Global brands appeal to universal principals, but must be locally adaptable (2005a: 3-4).

Coca-Cola (happiness), Louis Vuitton (luxury) Nike (sport), and Harley-Davidson (freedom) are often touted as great lifestyle brands. Coca-Cola in particular has used universalist messages, such as 'One World, One Coke', for decades, becoming the most valuable logo in the world, at >US$ 66B in 2007 (Interbrand, 2007).

3. Universalism and climate change

So what does a discussion on human rights, universalism, and cultural differences have to do precisely with climate change policy making? Climate change is a universal crisis that demands urgent, universal policy, just as human rights seemed a universal issue following the destruction of World War II. True universal deployment of the Universal Declaration of Human Rights was derailed by politicians claiming 'cultural relativism' (ASEAN, 1993). The UN Resident Coordinator in China, Khalid Malik, has stated 'A clean environment is a basic right' (Malik, 2007). This moves the discourse on climate change policy into the discourse on human rights, where cultural difference has effectively been used to deny universal implementation.

The motivation for this research is twofold: to debunk cultural difference as a real barrier to universal policy making in order to avoid a cultural relativist derailment on climate change policy as well; and to look at how the flipside of cultural difference, universal motivations inherent to all humans, can be invoked to successfully address climate change around the world.

Climate change has been alternatively framed as an issue of human rights (Watt-Cloutier, 2004; Malik, 2007), religious stewardship (Evangelical Climate Initiative, 2007), and morality (Gore, 2006). The former frames climate change mitigation as universally-humanistic right, while the latter clearly emphasizes our responsibility.

Religion, morality, and the natural world

> 'Religious leaders, liberal and conservative…understand that all spiritual life begins with a sense of wonder, and that one of the first windows to wonder is the natural world.'
> - Richard Louv (2007)

> 'science and religion are potential allies for averting mass extinction'
> - E.O. Wilson (2006)

The religions of the world roughly fall into three categories: indigenous, polytheistic, and monotheistic. The primary difference between the faiths in these three categories lies in different perceptions about the origin of power. These beliefs impact how they view their relationship to nature. Indigenous religions generally perceive the earth as the primary source of power, viewing spirituality within the natural world, to which they must pay reverence, and see themselves as part of this greater system. Polytheistic religions generally perceive power as originating from within the self and view themselves as part of the natural world, but emphasize a simplicity of living in it which by its nature will tread lightly on the Earth. Monotheistic religions generally perceive power as originating from a heaven-based god. The natural world is seen as a gift from God, over which they act as benevolent rulers.

Indigenous and polytheistic religions tend to see environmental care as self-evident and wholly in keeping with centuries of theological practice, while monotheistic religions view environmental responsibility as a modern subject to be debated. The latter struggles to reconcile their monotheistic responsibility to worship but one god with the fear that environmental care will be seen as a form of worship of the earth.

However, as scientific evidence builds about the existence, causes and solutions of climate change, many of these religious leaders have spoken out about environmental responsibility and recognize that while they approach climate change from very different motivations and backgrounds, they share common interests with scientists and believers of other faiths in protecting the earth. The Pew Forum on Religion and Public Life recently reported that:

> 'In contrast to abortion and other hot-button cultural issues, which divide most religious groups in the United States, there is fairly strong consensus across faith traditions on

> environmental policy…By a two-to-one margin (55% to 27%) respondents back strong regulations to protect the environment. Furthermore, the level of support is quite deep…Respondents in this survey were asked whether they favored stronger environmental regulations 'even if they cost jobs or result in higher prices'…(in ranking) priorities for religious voters, environment (53%) ranks higher than abortion (46%) or gay marriage (33%) (Pew Forum, 2004: 1-2).

Humans and the natural world

But what about our right to a healthy environment? According to Harvard Entomologist, E.O. Wilson (1984: 10):

> 'Our intrinsic emotions…crave the sense of a mysterious world stretching indefinitely beyond. The greater our knowledge, the deeper the mystery and the more we seek knowledge to create new mystery. Our sense of wonder grows exponentially.'

In his innovative research on ant colonies, Wilson (1984) found that humans had looked to the natural world for *understanding* and *meaning* for millennia. In more recent years, biologists, psychologists, educators, and designers, have confirmed that humans respond more deeply to just about any natural thing more than we would to just about any man-made thing. There is a complexity and a balance to the natural world that man cannot re-create. Somehow we instinctively know this and respond to that pull. We prefer entities that are complicated, evolving, and sufficiently unpredictable to be interesting. Nature provides us with *mystery*.

Given our choice, we will migrate towards a sanctuary that millennia ago would have improved our chances of *survival*. People in a variety of cultures and locations around the world prefer landscapes with tree groves that provide horizontal canopies, water, elevation changes, distant views, flowers, indications of other people or inhabited structures – all elements that indicate possible food, shelter, and places to explore. They make an artificial environment more habitable.

Contact with nature provides people with a sense of *joy*, which translates into a more effective space for learning, working and living.

In a study performed by the Heschong-Mahone (1999) group elementary school students in classrooms with the most [diffuse] daylight showed a 21 percent improvement in learning rates compared to students in classrooms with the least daylight. A study at Herman-Miller (2004) showed up to a 7% increase in worker *productivity* following a move to a green, day-lit facility. A Lawrence Berkeley National Laboratory study (Kumar and Fisk, 2002) found that U.S. businesses could save as much as $58 billion in lost sick time and an additional $200 billion in worker performance if improvements were made to indoor air quality. Workers were more excited about work, in better spirits at work, felt less fatigue, and rated their job satisfaction higher in the new building (Kats et al., 2003).

According to Robin Moore, an expert on the design of environments for children, 'Natural spaces and materials *stimulate* a children's limitless imagination and serve as the medium of inventiveness and creativity' (Louv, 2007: 5). Louv further states that children played more creativity, cooperatively, and displayed longer attention spans with direct experiences in nature.

Innovators in a wide variety of fields have studied the natural world for design inspiration. In many cases, nature already provides us with many complex, self-sufficient systems to study, mimic, and test, which is far more efficient than trying to build new, inferior systems of individual parts at random. We already live with several revolutionary products that were inspired by nature – Velcro (barbs on weed seeds); the Sydney Opera House (milkweed pods and sea shells); the telephone (mimicked the Human tongue and ear drum); and of course, the most famous of all bird-watchers…the Wright Brothers (Benyus, 2002).

Future myth

Nearly a decade ago Campbell predicted that 'future myths' would revolve around a common concern for the planet upon which we all depend to survive (Campbell and Moyers, 1991). Spurred by environmental degradation (United Nations, 2005), increasingly severe weather, storms and droughts, demographic shifts, growing environmental ethics and financial concerns (Smart Growth, 2007) climate change and environmental stewardship have become mainstream conversation.[5] Charles Tilly's (2006) research on meaning making assert that dramatic changes, like the severe climate changes experienced in nearly every corner of the world, have forced people of diverse backgrounds to find reasons – or what he calls 'organized answers to the question of 'why?'' – for climate change. As Tilly further explains, 'while explanations for causes and consequences of major events (are) bound to cultural and national conditions and history…(the) giving of reasons… connects people with each other…(and)…provides… shared accounts of what is happening'. These shared accounts begin to constitute a common explanation or myth about the world around us. Climate change is increasingly seen as one the 'great narratives in global society' (Neverla, 2007), and through these conversations, societies can create a new mythology, which makes sense of the present and tries to predict the future.

4. Conclusion

> 'A Native-American taught me that the division between ecology and human rights was an artificial one, that the environmental and social justice movements addressed two sides of a larger dilemma. The way we harm the earth affects all people, and how we treat each other is how we treat the earth'
> - Paul Hawken (2007)

[5] Fifty-eight percent of Americans, whose 'ecological footprint' marks one of the most disproportionate uses of the world's natural resources (Venetoulis and Talberth, 2005) believe not only climate change as a result of global warming has already begun, but that it is the result of man-made operations, not natural cycles (Zogby International 2006)

Thanks to the recent IPCC (2007) Assessment Report, the Stern Review (2006) and the collective actions of millions within the social justice movement (Hawken, 2007), the general public finally understands that climate change is real and that our human activities are the primary cause of it. 'Saving the planet' no longer means that the planet itself needs to be saved out of some feel-good principal, but that the human race needs to act quickly in order to preserve the delicate natural balance which allows us as a species to live here. The planet will survive. Will we be able to survive upon it? What steps need to be taken to mitigate the worst scenarios predicted in the reports mentioned above?

Unlike human rights, which are supported by the basic principles of religions and stable societies around the world, addressing climate change requires the engagement of millions of individuals performing multiple steps to reach a more obscure goal. In the Western world, this will likely include modifications of the consuming and mobile lifestyles to which we are accustomed. Successful engagement at this level requires personal, mass commitment to deeper, universal principals, such as those already found in mythology, art, religion, commerce, and human rights.

2007 has been labeled the tipping point (Gladwell, 2000) on climate change; the year that the natural world earned front page coverage, an Oscar, and even the Nobel Prize. Most importantly, it earned the respect and urgency of the general public (WPO and CCGA, 2007), who now want to know exactly what they have to do to help. According to the National Institute for Public Health and the Environment (RIVM, 2004), 70% of Dutch citizens see climate crisis as a social dilemma, expect the government to organize a response and are prepared to adjust their own behavior if others around them do as well. However, policy makers, academics, and the media reporting on climate change often severely underestimate the willingness of individuals to engage in this process. Assumptions are made that 'lifestyles must be maintained' by business and governments, who, not coincidentally, may benefit from increases in energy uSage Publications. The Chairman[6] of the U.S. House of Representatives Energy and Commerce Committee, who also represents the 'auto' state of Michigan, was so certain that the public was not willing to sacrifice that he threatened to introduce a huge carbon tax, simply so it could be defeated, in order to prove his point (Andrews, 2007).

However, instead of assuming a lack of commitment, we must *tap into the collective desire* that already exists *to unite against a common threat*. Show normal people how to do something in the face of a worldwide crisis instead of leaving them to our human tendency towards the environmental fatalism, already documented in the first century B.C. (Hudson, 1993).

[6] John Dingell also represents the Democratic Party, which is currently seen as more willing to address the climate change crisis (Earth Day Network, 2006).

Following the attacks on 11 September 2001, most U.S. Americans were prepared to sacrifice anything to prevent another attack. Unfortunately, instead of calling for a reduction in arms proliferation or oil usage or an increase in diplomacy and personal reflection, U.S. President Bush told Americans to go shopping (Bush, 2001). This was supposed to show the terrorists that they would not beat us by changing our (consuming) lifestyle. This is in sharp contrast to the calls, and answers, for rationing during WWII, the oil-crisis induced run on energy-efficient cars in 1973-4, and the water rationing during the California drought in 1976-7. During the California droughts, residents were not allowed to wash their own cars, nor run their sprinklers, and were encouraged to take short, 'military' showers. Even in the most Libertarian-Republican type of neighborhoods, this kind of specific policy was welcomed. It was a collective cause around which neighbors rallied, made jokes, and used social pressure to ensure the reluctant conformed.

The success or failure of worldwide cooperation on 'global environmental governance' is dependent upon many factors, but any true climate change policy must be made inside of a *larger discussion of sustainable growth*, while '*connecting the dots'* between the economy, environment, security and energy. Research by IPCC Contributor and Fletcher Professor of International Negotiation, Adil Najam (2005), articulates how the G77 has effectively questioned the status quo assumptions of the G7 around the debate on climate change. 'First multiple sides coalesced into G77 and (later) the concept of sustainable development… allowed for a valuable dialogue (on global warming) between (the) North and South'. Sustainability can be defined in many ways, but at its heart is the idea that any man-made structure or activity is self-sustaining (i.e., producing and using its own energy, water, and air (oxygen), consuming its own waste, and providing in advance for its own decomposition). In other words, zero impact. Our structures and activity must find the balance of a new triple bottom line (McDonough and Braungart, 2002), a workable sustainability between people, planet and profit, where every project looks at the social, economic, and environmental impacts it has on the world.

In addition, we can *learn from the natural world* itself and those who live sustainably within it. Víctor Toledo (2000) demonstrates a clear link between indigenous peoples and biodiversity (90% of biodiversity lies within indigenous areas), providing clear evidence that our biodiversity can only be conserved if we 'maintain, reinforce or give control to the indigenous communities on their own territories and natural resources as well as sufficient access to information and technology, which give the communities both an economic incentive and a legal basis for stewardship' (Toledo, 2000: 10). In addition he argues that 'indigenous societies house a repertory of ecological knowledge which generally is local, collective, diachronic and holistic' (Toledo, 2000: 7). Their normal way of life minimizes waste and maximizes sustainability, exemplifying what we label carbon neutral/ low footprint lifestyle.

According to Friends of the Earth International (2007), more than 90 percent of food requirements in Africa are met with indigenous farming systems, such as saving seeds and native harvesting (LaDuke, 2007), which have sustained communities for millennia. Instead of battling over 'who owns lifeforms, foods, and medicines[7] that have throughout history been the collective property of indigenous peoples' (LaDuke, 2007: 2) we should be learning from their practices and stop the 'large-scale, industrialized, vertically integrated food production' by global agribusiness conglomerates (Kingsolver, 2003).

Further, since 'there is no technofix to the disastrous impact of air travel on the environment[8], the only answer is to ground most of the aeroplanes flying today' (Monbiot, 2006). Climate change mitigation will require a general *de-mobilizing of Western lifestyles* and a re-acquaintance with local sources. Distinguishing between the lack of trust and miscommunication inherent in lower-presence, mediated communication (Nevejan, 2007) and miscommunication that truly stems from culture difference will become even more critical.

Finally, we must *reclaim the discourse on climate change mitigation from the commercial world* and stop looking to the individual, profit-driven entities within the commercial world to solve our universal crisis. Climate change will only be solved through collective, public action into which commercial enterprises will have the opportunity to feed new technologies and ideas. Decoupling climate change solutions from the commercial will allow more de-centralized, more local solutions to flourish (Arnoldy, 2007). Included in this process is the dispelling of the notion that we must choose between environmental stewardship and economic growth. In the just released California Green Innovation Index (Next 10, 2006: 3), 'as a result of the first wave of green innovation, which began in the 1970s…California is more energy efficient and emits fewer greenhouse gas emissions per person than the rest of the United States, Germany, the United Kingdom or Japan. California's economy has grown (20%) as a result of this first wave of green innovation'. In addition, its 'ratio of (greenhouse gas) GHG[9] emissions to GDP' has dropped from 0.45 in 1990 to 0.35 in 2004. One particularly interesting chart (Next 10, 2006: 18) shows that 'the growing separation (between carbon emissions cap and inflation adjusted GDP dollars per cap) illustrates the declining dependence of California's economic growth on environmental degradation'.

In his denial that a choice must be made between economic growth and human rights, Sen (1999) explains, there is a 'broad consensus on a list of 'helpful policies' that includes openness to competition, the use of international markets, public provision of incentives for investment and export, a high level of literacy and schooling, successful land reforms, and other social

[7] Ninety-seven percent of all patents are held by industrialized countries (Howard, 2001).
[8] 'Aviation is the fastest growing cause of climate change. By 2050 it will account for more than 15% of world wide CO2 levels…every tonne of emissions from aircraft has the effect of 2.7 tonnes due to its 'radiative force'…aviation is one of the single largest threats to climate stability, and consequently to life on earth' (Garman, 2006: 1).
[9] Carbon emissions account for roughly 72% of all greenhouse gas emissions (Next 10, 2006: 18).

opportunities that widen participation in the process of economic expansion…(further)… there is overwhelming evidence to show that what is needed for generating faster economic growth is a friendlier economic climate rather than a harsher political system'.

The ideas outlined above are by no means conclusive, but I am encouraged by the swell of interest and support, not only to address climate change, but our broken relationship with the natural world and our world community. I close this paper with…

> '…nature, imaginative by necessity, has already solved many of the problems [10]we are grappling with. Animals, plants, and microbes are the consummate engineers. They have found what works, what is appropriate, and most important, what lasts here on Earth. After 3.8 billion years of research and development, failures are fossils, and what surrounds us is the secret to survival…The conscious emulation of life's genius is a survival strategy for the human race, a path to a sustainable future. The more our world looks and functions like the natural world, the more likely we are to endure on this home that is ours, but not ours alone.'
> - Janine Benyus (2002)

References

Amnesty International (2007) URL (consulted January 2008): www.amnesty.org/campaign

Andrews, E. (2007) 'Counting On Failure, Energy Chairman Floats Carbon Tax,' *New York Times*, 7 July.

Annan, K. (1997) Statement on the Fiftieth Anniversary Year of the Universal Declaration of Human Rights (Tehran), 10 December. URL (consulted December 2007): www.un.org/rights/50/dpi1937.htm.

Arnoldy, B. (2007) 'Now In The Bay Area: The Anti-Gas Station,' *Christian Science Monitor*, 30 April.

Ashcroft, B., Griffiths, G. and Tiffin, H. (1998) *Post-Colonial Studies: The Key Concepts*. London: Routledge.

aSmallWorld (2007) URL (consulted November 2007): www.asmallworld.net

Association of the Southeast Asian Nations ASEAN (1993) Bangkok Declaration. Bangkok: ASEAN, 29 March – 2 April URL (consulted January 2008): www.aseansec.org/1629.htm

Benkirane, R. (2002) 'The Cultural Dimension of the Current Crisis,' *Behind the News: Visions for Peace - Voices of Faith Bulletin*, Geneva: World Council of Churches, Issue 14.

Benyus, J. (2002) *Biomimicry: Innovation Inspired by Nature*. New York: Harper Perennial.

Burgess, H. (2003) 'Stereotypes / Characterization Frames,' in G. Burgess and H. Burgess (eds) *Beyond Intractability*. University of Colorado, Boulder: Conflict Research Consortium, URL (consulted May 2007): www.beyondintractability.org/essay/stereotypes/

Bush, G.W. (2001) President Discusses War on Terrorism In Address to the Nation Press Release, 8 November, URL (consulted June 2007): www.whitehouse.gov/news/releases/2001/11/20011108-13.html.

Campbell, J. and Moyers, B. (1991) *The Power of Myth*. New York: Anchor Books/Doubleday.

Connerley, M. and Pedersen, P. (2005) 'Cultural Frameworks and Their Importance for Leaders' in *Leadership in a Diverse and Multicultural Environment: Developing Awareness, Knowledge, and Skills*, pp. 39-54. Thousands Oaks, CA: Sage Publications.

De Swaan, A. (2006) 'Language Conflicts', in: University of Amsterdam Culture, Identity, Violence Seminar Series. Amsterdam, 9 March.

Earth Day Network (2006) 'A New Climate Change National Poll: Politics of Global Warming on Election Day', URL (consulted December 2007): www.earthday.net/~earthday/nationalpoll.

Evangelical Climate Initiative (2007) URL (consulted December 2007): www.evangelicalclimateinitiative.org

Film Fest (2004) URL (consulted December 2007): www.tqnyc.org/NYC040592/statistics/toptenforeignlanguage.html

Friends of the Earth International FOEI (2007) URL (consulted December 2007): www.foei.org/en/publications/link/100/1819.html

Gardenswartz, L., Rowe, A. Digh, P. and Bennet M. (2003) *The Global Diversity Desk Reference: Managing an International Workforce.* San Francisco, CA: Jossey-Bass.

Garman, J. (2006) Greenwash Exposed – BAA, URL (consulted October 2007): www.turnuptheheat.org/?page_id=16

Genocide Watch (1998) URL (consulted December 2007): www.genocidewatch.org/8stages.htm

Gerringer, S. (2006) *Practical Campbell: Movies—Medium for Myth?* San Anselmo, CA: Joseph Campbell Foundation.

Gladwell. M. (2000) *The Tipping Point: How Little Things Can Make a Big Difference*. New York: Little, Brown and Company.

Gore, A. (2006) *An Inconvenient Truth: The Planetary Emergency of Global Warming and What We Can Do About It*. DVD: Paramount.

Habermas, J. (1991) *The Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society* (trans.) T. Burger and F. Lawrence. Cambridge, MA: MIT Press.

Hall, S. (1979) ‘Culture, the Media, and the 'Ideological Effect’’ in J. Curran, M. Gurevitch and J. Woollacott (eds) *Mass Communication and Society*, volume 3: 15-48. Beverly Hills: Sage Publications.

Hamelink, C. (2006) ‘Globalisation Of Culture: The Violent And Non-Violent Search Of Identity’, in: University of Amsterdam Culture, Identity, Violence Seminar Series. Amsterdam, 23 March.

Harness, B. (2007) Telephone Interview, September.

Havel, V. (2000) ‘Address by the President of the Czech Republic’ in Summary Proceedings: Annual Meeting 2000, pp. 1-5. Prague: International Monetary Fund. URL (consulted December 2007): www.imf.org/external/am/2000/speeches/PR01E.pdf.

Hawken, P. (2007) *Blessed Unrest: How the Largest Movement in the World Came into Being and Why No One Saw It Coming*. New York: Viking Penguin.

Herman-Miller (2004) *Evolutionary Psychology and Workplace Design, Doing What Comes Naturally*. Zeeland, MI: Herman-Miller.

Heschong Mahone Group (1999) *Daylighting in Schools: An Investigation into the Relationship Between Daylight and Human Performance*, report to The Pacific Gas and Electric Company, San Francisco.

Hofstede, G. (2001) *Culture's Consequences, Comparing Values, Behaviors, Institutions, and Organizations Across Nations*. Thousand Oaks, CA: Sage Publications.

Howard, S. (2001) *Life, Lineage and Sustenance: Indigenous Peoples and Genetic Engineering: Threats to Food, Agriculture, and the Environment: A Primer and Resource Guide* (eds.) D. Harry and B.L. Shelton. Wadsworth, NV: Indigenous Peoples Council on Biocolonialism.

Hudson R. J. (1993) ‘Origins of Wildlife Management in the Western World’, in A. W. L. Hawley, *Commercialization and Wildlife Management: Dancing With the Devil*, Volume 5, p. 21. Malabar, FL: Krieger Publishing Company.

Huntington, S. (1993) ‘Clash of Civilizations’, *Foreign Affairs* 72 (3): 22-49.

IMDB (2007) Internet Movie Database, URL (consulted May 2007): www.imdb.com/boxoffice/alltimegross?region=non-us

Interbrand (2005a) *Going Global: Global Branding – Risks and Rewards*. New York: Interbrand.

Interbrand (2005b) Mission Statement, URL (consulted January 2005): www.interbrand.com/about_us.asp.

Interbrand (2007) *All Brands Are Not Created Equal: Best Global Brands 2007*. New York: Interbrand.

Jung, C. G. (1934-1954) *The Archetypes and The Collective Unconscious* (trans) R.F.C. Hull (1968) Collected Works Bollingen Series XX. Princeton, N.J.: Bollingen.

Kats, G., Alevantis, L., Berman, A., Mills, E. and Perlman, J. (2003) *The Costs and Financial Benefits of Green Buildings, a Report to California's Sustainable Building Task Force*, Sacramento, CA.

Kaufman, A. (2004) 'Listening to the World: Foreign Films Bounce Back in 2004', URL (consulted February 2009): www.indiewire.com/article/listening_to_the_world_foreign_films_bounce_back_in_2004/.

Kim, D. (1994) 'Is Culture Destiny? The Myth of Asia's Anti-Democratic Values', *Foreign Affairs*, 73(6): 189-94.

Kingsolver, B. (2003) *Small Wonder: Essays*. New York: Harper Perennial.

Kluckhohn, C. and Strodtbeck, F. (1961) *Variations in Value Orientations*. Evanston, IL: Row, Peterson.

Kuipers, G. (2007) 'The Globalization of Humor: Translation and Acculturation of American Television Comedy in France, Italy, the Netherlands and Poland', in: University of Amsterdam Mobility Conference. Amsterdam, 25 January 2007.

Kumar, S. and Fisk, W. (2002) *The Role of Emerging Energy Efficient Technology in Promoting Workplace Productivity and Health Final Report*, prepared for the U.S. Department of Energy, Washington: Lawrence Berkeley National Laboratory.

LaDuke, W. (2007) 'Ricekeepers: A Struggle To Protect Biodiversity and a Native American Way of Life', *Orion Magazine* July/August, URL (consulted September 2007): www.orionmagazine.org/index.php/articles/article/305.

LeBaron, M. (2003) 'Culture-Based Negotiation Styles', in G. Burgess and H. Burgess (eds) *Beyond Intractability*. Boulder, Colorado: Conflict Research Consortium, University of Colorado, URL (consulted May 2006): www.beyondintractability.org/essay/culture_negotiation/.

LeVine, R. A. and D. Campbell (1971/1972) *Ethnocentrism: Theories of Conflict*, Ethnic Attitudes and Group Behavior. New York: John Wiley.

Lists of Bests (2007) URL (consulted July 2007): www.listsofbests.com/list/1887.

Littman, D. (1999) 'Universal Human Rights and "Human Rights in Islam"', *Midstream*, February/March.

Lonely Planet (2004) *One Planet*. Melbourne: Lonely Planet Publications.

Louv, R. (2007) 'Leave No Child Inside', *Orion Magazine*, March-April.

Maleuvre, D. (2004) 'Beyond Culture', *Journal Of Human Values* 10 (2): 131-41.

Malik, K. (2007) Remarks at UN China breakfast meeting on climate change, in: United Nations Global Compact Leaders Summit. Geneva, 5 July 2007.

McDonough, W. and Braungart, M. (2002) *Cradle to Cradle: Remaking the Way We Make Things*. New York: North Point Press.

Merriam-Webster (2007) Online Dictionary, URL (consulted April 2007): www.webster.com/dictionary/culture

Monbiot, G. (2006) 'On The Flight Path To Global Meltdown'. *Guardian Online*, 21 September, URL (consulted September 2006): www.guardian.co.uk/environment/2006/sep/21/travelsenvironmentalimpact.ethicalliving.

Movie Web (2007a) URL (consulted July 2007): www.imdb.com/boxoffice/alltimegross

Movie Web (2007b) URL (consulted July 2007): www.movieweb.com/movies/boxoffice/alltime

Mydans, S. (2007) 'Monks Are Silenced, and for Now, Internet Is, Too', *New York Times*, 4 October.

Najam, A. (2005) 'Developing Countries and Global Environmental Governance: From Contestation to Participation to Engagement', *International Environmental Agreements: Policy, Law, and Economics* 5 (3): 303-21.

National Resource Defense Council (2007) URL (consulted July 2007): www.savebiogems.org/patagonia

Natural Capital Institute (2007) URL (consulted July 2007): www.naturalcapital.org

Nevejan, C. (2007) *Presence and the Design of Trust*. Ph.D Thesis. Amsterdam: University of Amsterdam).

Neverla, I. (2007) 'Storms as Media-Drama: Reconstructing the Public Discourse on Climate-Change', in: IAMCR Working Group on Environmental Issues, Science and Risk Communication. Paris, 23 July 2007.

Next 10 (2006) *California Green Innovation Index*. Palo Alto, CA: Next 10.

Parsons, T. and Vogt, E. (1962) 'Kluckhohn Eulogy', *American Anthropologist*, 64: 140-61.

Pew Forum (2004) 'Religion & Public Life Survey Reports: Religion and the Environment', URL (consulted July 2007): http://pewforum.org/publications/reports/ReligionEnvironment.pdf.

RIVM (2004) *Sustainable Quality of Life: A Question of Choosing* (Duurzame kwaliteit van leven: een kwestie van kiezen). Bilthoven, Netherlands: (Dutch) National Institute for Public Health and the Environment.

Rotary Club (2007) URL (consulted September 2007): www.rotary.org/aboutrotary.

Sajid, A. (2004) 'Islam and the Middle Way', in: *For A Change*. Caux, Switzerland: Initiatives of Change.

Santoro, L. (2001) 'Magical Romance Blog', URL (consulted September 2007): www.imdb.com/title/tt0190332/usercomments.

Sen, A. (1999) 'Democracy as a Universal Value', *Journal of Democracy*, 10 (3): 3-17.

Sen, A. (2005) *The Argumentative Indian*. London: Allen Lane.

Sen, A. (2006) *Identity and Violence: The Illusion of Destiny*. New York: W.W. Norton and Company.

Singer, M. (1987) *Intercultural Communication: A Perceptual Approach*. Upper Saddle River, NJ: Prentice Hall College Division.

Singer, M. (2000) 'The Role of Culture and Perception in Communication', in G. Weaver (ed.) *Culture, Communication and Conflict: Readings in Intercultural Relations*, pp. 28-53. Boston: Pearson Publishing.

Smart Growth (2007) URL (consulted September 2007): www.smartgrowth.org

Steiner, K. (2005) 'Asian Values: Challenging the Paradigms of International Human Rights?', in: Irmgard Coninx Foundation Berlin Roundtables on Transnationality: Reframing Human Rights. Berlin, 4-6 October 2005.

Stern, N. (2006) Stern Review: The Economics of Climate Change. London: Cabinet Office – British Treasury Report to the Prime Minister and the Chancellor of the Exchequer URL (consulted June 2007): www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm.

Tharoor, S. (1999/2000) 'Are Human Rights Universal?' *World Policy Journal* XVI (4): 1-6.

Tilly, C. (2006) *Why?* Princeton, NJ: Princeton Press.

Toledo, V. (2000) 'Indigenous Peoples and Biodiversity', in S. Levin et al (eds.) *Encyclopedia of Biodiversity*. New York: Academic Press.

UnDutchables (2008) URL (consulted February 2008): www.undutchables.com.

United Nations (2004) *Human Development Report: Cultural Liberty*. New York: United Nations Development Programme.

United Nations (2005) *Millennium Ecosystem Assessment*. Geneva: United Nations Environment Programme.

Universiteit van Amsterdam (2006) *Characteristic UvA Research: Research Perspective*. Amsterdam: Cultural Analysis Department.

Venetoulis, J. and Talberth, J. (2005) *Ecological Footprint of Nations*. Oakland: Redefining Progress.

Vogler, C. (1998) *The Writer's Journey: Mythic Structure for Writers*. Studio City, CA: Michael Wiese Productions.

Watt-Cloutier, S. (2004) 'Check Against Delivery', in: Conference of Parties to the United Nations Framework Convention on Climate Change. Buenos Aires, 15 December, URL (consulted September 2007): www.inuitcircumpolar.com/index.php?ID=282&Lang=En.

West, C. (1993) *Beyond Eurocentrism and Multiculturalism: Prophetic Reflections: Notes on Race and Power*. Monroe, ME: Common Courage.

Wilson, E.O. (1978) *On Human Nature*. Cambridge, MA: Harvard University Press.

Wilson, E.O. (1984) *Biophilia*. Cambridge, MA: Harvard University Press.

Wilson, E.O. (1999) *Consilience*: *The Unity of Knowledge*. New York: First Vintage.

Wilson, E.O. (2006) *The Creation: An Appeal to Save Life on Earth*. New York: W. W. Norton.

Wood, P. (1991) 'French Thought Under Mitterrand: The Social, Economic and Political Context for the Return of the Subject and Ethics, for the Heidegger Scandal, and for the Demise of the Critical Intellectual', *Contemporary French Civilization* XV (2): 244-6.

WorldPublicOpinion.org (WPO) and Chicago Council on Global Affairs (CCGA) (2007) 'Poll Finds Worldwide Agreement That Climate Change is a Threat', URL (consulted September 2007): www.worldpublicopinion.org/pipa/pdf/mar07/CCGA+_ClimateChange_article.pdf.

YouTube (2007) URL (consulted September 2007): www.youtube.com

Zogby International (2006) 'Americans Link Hurricane Katrina and Heat Wave to Global Warming', URL (consulted June 2007): www.zogby.com/News/ReadNews.dbm?ID=1161.

Author information

After nearly twenty years working within global commercial and non-profit organizations in international communications and strategic planning, Judy M. Ford is currently a PhD candidate of the Faculty of Social and Behavioral Sciences at the University of Amsterdam in The Netherlands. This paper was an early excerpt of the PhD dissertation and a 'work in progress'.

Comments are welcomed at jford156@gmail.com.

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Braga: Centro de Estudos de Comunicação e Sociedade, Universidade do Minho
Available from: http://www.lasics.uminho.pt/ojs/index.php/climate_change

4

Religious positions on climate change and climate policy in the United States[1]

Arjan (J.A.) Wardekker, Arthur C. Petersen and Jeroen P. van der Sluijs

Abstract

February 2006, a group of 86 evangelical leaders, under the auspices of the Evangelical Climate Initiative, challenged the Bush administration on global warming. Other religious groups and leaders in the USA, and other countries, have taken positions as well. As the US evangelical community seems to have a considerable influence on the views and policy of (Republican) national leaders, these developments are relevant for assessing US and international climate policy. Using argumentative discourse analysis, this paper analyzes the religious positions on climate change and climate policy in the United States, as evident in their communication in the media, opinion documents, and websites. Religious positions show a wide range of views, images, and discourses that deal with fundamental moral and ethical questions concerning climate change, stewardship and social justice. Our main conclusion is that both proponents and opponents of strict climate policy strongly value these concepts, but that they interpret them in different ways. A robust policy strategy (regarding support in the religious community) should pay careful attention to the effects of both climate change and climate policy on the poor in both developing nations and the USA itself.

Keywords: environmental justice, equity, ethics, religion and environment, climate policy, United States

1. Introduction

February 2006, a group of 86 evangelical leaders, under the auspices of the Evangelical Climate Initiative (ECI), challenged the Bush administration on global warming with their 'Evangelical Call to Action' (ECI, 2006). Other religious groups and leaders in the USA and other countries have taken positions on this issue as well. The (religious-)ethical aspects of climate change are the central theme of their statements. The debate has attracted much attention in the media, and some attention in scientific forums as well (e.g. Kolmes and Butkus,

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2007; Nisbet, 2006; Nisbet and Mooney, 2007). Simultaneously, climate change and climate policy have become more prominent in the US political debate as well, often with moral and religious-ethical connotations. For example, Al Gore notes in his 'An Inconvenient Truth' that it is 'deeply unethical' to allow the rise in CO_2 emissions to continue (Gore, 2006). President Bush referred in the State of the Union in January 2007 for the first time to climate change as a serious societal issue, noting that technological breakthroughs would allow us to become 'better stewards of the environment' (Bush, 2007).

Climate change and climate policy raise many questions that have strong moral and ethical dimensions, which are important for policy formation and international negotiations (Brown, 2003; Brown et al., 2006; Gardiner, 2006). The issue is riddled with social dilemmas due to e.g. the spatial and temporal dispersion of causes and effects, diffusion of responsibility for the problem, and lack of institutions through which different countries and generations can effectively influence each others' behaviour (Gardiner, 2006; Jamieson, 1992). One of the main ethical dimensions of climate change therefore is the issue of distributive justice. Climate policy deals with the question of how best to divide a scarce resource that no one owns, i.e. how to equitably (both interregionally and intergenerationally) distribute the costs (e.g. climate change impacts) and benefits (e.g. economic growth) of emissions and responsibility for policy action to mitigate and adapt to climate change (Brown et al., 2006; Gardiner, 2004, 2006; Grubb, 1995; Singer, 2006). See e.g. Gardiner (2004), Groenenberg and Van der Sluijs (2005), and Grubb (1995) for extensive discussion of the ethical aspects of various approaches to assigning emission reduction targets. Other specific ethical issues include procedural justice (who gets to participate in policymaking and how), how to deal with the many uncertainties (who should bear the burden of proof, and if, when and how to act under uncertainty), research approaches (e.g. economic approaches such as discounting and cost-benefit analysis), and some specific policy approaches (especially geoengineering) (Brown et al., 2006; Gardiner, 2007; Jamieson, 1996; Singer, 2006; Toman, 2006). Generally speaking, climate change is an ethical, as well as religious, issue because it poses questions on how we ought to live and how humans should value and relate to each other and non-human nature. In addition to insights from economics and natural science, moral and religious-ethical considerations form an important input for policymaking on complex and uncertain issues such as climate change (Hogue, 2007; Jamieson, 1992; Rolston, 2006).

Different religious views (or more generally, different philosophies of life) can lead to different approaches to environmental issues. One often-heard complaint, especially towards Judeo-Christian traditions, is that the classic 'dominion' argument (mankind transcends and has rightful mastery over nature) results in the abuse and destruction of nature (Greeley, 1993; Guth et al., 1995; ICT, 2006; Schultz et al., 2000; Trevors and Saier, 2006; White, 1967). One's view on the relationship between man and nature influences one's attitude towards ecology. A different, less

anthropocentric, approach to nature and religion (also included within Judeo-Christianity) would prove less destructive (White, 1967). Others point to 'End Times thinking' (dispensationalism) as an additional barrier to support for environmental policy (Guth et al., 1995). Presenting religious beliefs as the sole source of anti-environmental attitudes, however, seems too simplistic. Greeley (1993) and Schultz et al. (2000) argue that, while studies have indeed found a negative relation between Judeo-Christian beliefs and pro-environmental attitudes, this relation is often small and may be due to political and moral conservatism rather than religion itself. Nonetheless, different religious views do seem to be related to *what type* of concerns people hold. For example, Schultz et al. (2000) found that respondents who expressed more literal beliefs in the Bible scored lower on ecocentric environmental concerns, but higher on anthropocentric environmental concerns. No relation was found with self-reported pro-environmental behaviour. These different bases for environmental concerns could however result in different views on both the nature of an environmental problem, as well as the desirability of various policy strategies to counter it.

Considering the large influence of religion on public life in the United States, the strong focus on the ethical aspects of climate change in the religious debate, and the important choices that will need to be made in the coming years concerning international climate policy, it is interesting to explore the perceptions among religious groups on this issue. This study aims to provide an overview of the religious societal debate that is taking place among the US Judeo-Christian communities. What are their positions on climate change, what measures should (or should not) be taken to deal with it, and what moral and religious-ethical arguments form the foundations of these positions? Following from that, this paper presents some possible implications and lessons for policymaking.

2. Structure and methodology

Different social understandings of the world lead to different social actions: within a particular worldview, some forms of actions become natural whereas others become unthinkable (Jørgensen and Phillips, 2002; Runhaar et al., 2006). This paper analyzes the views and positions of various religious groups on climate change and climate policy and the ways they give meaning to the issue. These matters are explored by means of argumentative discourse analysis (Fischer and Forester, 1993; Hajer, 1995, 2005; Jørgensen and Phillips, 2002; Majone, 1981; Runhaar et al., 2006). Argumentative discourse analysis explores patterns in written or spoken statements and related practices in order to identify the representations of reality that are employed. It also explores the social-political practices from which social constructs emerge and in which the actors are engaged. The meaning of the scientific evidence in a given context is analyzed within the context of the particular social practices in which the discourse is

produced. In this paper, we employ the instrument of value mapping and argumentative analysis to analyze the discourses of interest.

A Value Mapping and Argumentative Analysis (Fischer, 1995; Van der Sluijs et al., 2003) aims to analyze different positions in a debate in a structured way. Actors in a debate can agree or disagree on an issue on different levels. Four levels of agreement/disagreement are discerned: (1) the ideological view, (2) the problem setting and goal searching, (3) problem solving, and (4) outcomes and fairness. For each of these levels, the views and positions of actors are mapped and compared, i.e. whether there is agreement or disagreement, and why. The four levels form two themes: views on the problem (section 4) and views on the solutions (section 5), each with a fundamental and a practical layer (levels 1 and 4, and 2 and 3 respectively). The ideological view is the deepest level where disagreement can occur and can lead to very different views of whether there is a problem or what it is. One can hold the view that a radically different ideological starting point is required. Ideological argumentation focuses typically on ideology and alternative societal orders. On the next level, problem setting and goal searching, groups may agree on the existence of a problem, but not on identifying precisely what the problem is, how to formulate it, and what the end goal or solution point should be. On the level of problem solving, groups may agree on the existence of a problem and further agree on policy goals but disagree on the strategies and instruments required to reach the goal. Problem solving argumentation typically focuses on effectiveness, side effects, and efficiency of methods. At the last level where disagreement can occur, outcomes and fairness, groups often care about the fairness of solutions to problems, but can hold different views on what constitutes fair outcomes. For example, one can hold the view that the policy at hand does not serve the public interest or public wellbeing. Fairness argumentation focuses typically on public interest, unexpected societal side effects, and distributive justice.

This study centres on the societal debate on climate change among (Judeo-Christian) religious groups in the United States. It includes the recent discussions that have attracted widespread media coverage, as well as earlier and less visible initiatives. Broader issues, such as the debate in other countries, in other religions, general public perception, and general religious perceptions of ecology and nature (besides the views that were brought up in the discussion on climate change), are taken into account to a limited extent. These issues are used to position the debate in a broader context. The main scope of the study is an inventory of the various positions and arguments. An overview of the different stakeholders and institutional setting, and the extent and timing of the societal debate is also presented. The study does not assess the quality and scientific validity of the arguments and the processes and events that shape the debate.

The field of study was initially explored by examining online news coverage on the recent statement of the Evangelical Climate Initiative, and later broadened. Sources were collected

using internet search and snowball sampling, and include opinion documents, press releases, website statements and frequently asked question sections, speeches, blogs, and online newspaper articles. These documents originate from religious groups/churches, associations and umbrella organizations of such groups, religious environmental groups and platforms, and individual leaders. Sources were selected based on their accessibility, relevance, and coverage of opinions, religious groups, and topics within the debate. In total, approximately 100 documents have been selected and analyzed. The study is part of a large project on 'Technology and Religion' by the Netherlands Study Centre for Technology Trends (STT), for which an essay was written as a primer on the topic for an interested general public (Wardekker and Petersen, 2008). Therefore, public accessibility was an important criterion.

3. Participants in the religious climate debate

The recent call by the Evangelical Climate Initiative (ECI) does not stand alone, and is not the first of its kind either. Similar calls and statements concerning climate change can be found originating from various Christian traditions in the United States, such as Evangelicals, Baptists, Catholics, Quakers, and umbrella organizations of multiple denominations, dating back to the early 90s (Wardekker and Petersen, 2008). Knickerbocker (1998) already describes a 'growing trend among faith groups to emphasize the environment', but apparently these initiatives never received much media attention (Hogue, 2007), at least until the recent revival of the debate. The majority of public statements originate from national associations of churches (e.g. the US Conference of Catholic Bishops) and national topical religious networks (e.g. the Evangelical Environmental Network). Media articles often quote the opinions of individual leaders in their own right (though their affiliation is usually mentioned). Regional associations and individual churches provide material as well. Besides calls for stricter climate policy, some other initiatives can be found that criticize these proposals. E.g. the Interfaith Stewardship Alliance (ISA) has published a response to ECI's 'Call to Action' (ISA, 2007). This counter-movement consists mainly of topical groups and individual leaders, usually connected to conservative religious organizations. It is however interesting to note that the evangelical proponents of stricter environmental policy also present themselves as 'biblically orthodox' (EEN, 2007) and religiously/politically conservative in general, apparently in response to 'identity framing' attempts describing (religious) environmentalism as spiritualistic and drawing connections with liberalism, 'new age' like ideas, or even nature worship (see e.g. EEN, 2007; Ekklesia, 2006; Hagerty, 2006; Harden, 2005; Sirico, 1997) (it should be noted that religiously inspired opponents of strict policy face similar identity framing attempts, referring to them as fanatics).

Climate change is also an issue in other arenas besides that of US Christian groups. Similar initiatives can be found in other countries, such as the United Kingdom, Australia and The Netherlands, as well as on an international level, most notably from the World Council of

Churches. It appears however, that there is not as much of an open debate between groups of religiously inspired proponents and opponents of strict climate policy, as is the case in the United States. Opinion pieces can be found from many other religions as well, e.g. Judaism, Islam, and indigenous religions. In the recent US debate, Jewish groups/leaders often cooperate with the Christians. And finally, climate change has been an issue in the 'general' public debate, i.e. general public opinion (which includes religious views), for many years. These other arenas are occasionally referred to in this paper to provide context.

4. Views on the problem

A considerable portion of the debate on climate change among religious groups in the United States deals with whether the issue is a problem, what the problem is exactly, and what goals should be set for the future. Differences in opinion range from more practical matters such as which aspects of climate change and climate policy are considered important, to fundamental matters such as the world we would want to live in and how it should be managed.

Most opinion documents that plea for stricter climate policy start with the statement that there is a scientific consensus on anthropogenic climate change, emphasizing certainty. A few sources treat uncertainties in a more open manner (e.g. USCCB, 2001). Furthermore, the consequences will be large and negative. Opponents of strict policy emphasize uncertainty, or sometimes claim certainty for the opposite. They see no consensus, only a limited and natural climatic change, and limited and not only negative consequences. Both parties refer to scientific reports, institutes, and (religious) scientists whom they consider reliable. In the recent debate, both groups have also actively formed coalitions with those scientists (e.g. Beisner et al., 2006; Harvard-CHGE and NAE, 2007; NAE, 2007; Spencer et al., 2005).

4.1. Ideological view

One of the most fundamental aspects of the debate on climate change among religious groups becomes apparent when examining their perspectives on why changing the climate through human activities is (or is not) morally unacceptable. The Evangelical Climate Initiative's 'Call to Action' states: 'This is God's world and damage we do to God's world is an offence against God Himself'. This opinion is connected with the commandment to 'love God and love what God loves' (ECI, 2006), gratitude for the gift of creation and passing this gift on to future generations. Most sources mention generically damage to the world, nature, or the natural system. A few others more specifically mention destruction of habitats, vanishing of species or ecosystems, and decline in biodiversity. These issues concerning the impacts of climate change on nature relate to the concept of 'stewardship', which is prevalent in all of the large monotheistic religions: mankind has the role to look after the wellbeing of the natural world. In the religious debate, care for the environment or climate is often referred to as 'creation care' or

'environmental/climate stewardship', avoiding the negative connotations that many evangelicals have with 'environmentalism' (e.g. Hedman in Harden, 2005; The Economist, 2007c). Both proponents and opponents of strict climate policy use and value this concept; both groups regard God as the owner of the world and mankind as a steward with the task to take care of nature. They also use similar imagery, describing the world as 'God's garden'.

While they use strikingly similar concepts and imagery, the interpretation of these concepts and images is very different, however. ECI's 'Call to Action' and similar initiatives argue that God created the earth as 'good' and that it is mankind's task to preserve 'God's good garden' (EEN, 1994), here referring to the wilderness. In contrast, their critics argue that mankind's task is to 'fill and subdue the earth' and to 'turn the wilderness into a garden' (Spencer et al., 2005), referring to a more 'landscaped' view of this garden. There are considerable differences in opinion on the relationships and roles of mankind, God, and nature. Opponents of strict policy tend to place mankind above nature and see nature's role more as something to serve mankind. While mankind should take care of nature, 'human beings come first in God's created order … And that primacy must be given to human beings and for human betterment' (Land in Hagerty, 2006). Their discourses place mankind as a 'co-creator' and relate to human development and population growth as a blessing and mission rather than a threat. They argue that God would not have created nature so fragile that mankind could easily destroy it, and that God would not have intended healthy nature and human development to be incompatible. Proponents of strict policy on the other hand emphasize mankind's interdependence with nature, warning that the natural balance is threatened, and they see mankind as part of nature (reminiscent of many indigenous religions and eastern traditions, but similar thoughts are also expressed from e.g. Islam). Following this line of reasoning, some also relate protecting nature to the commandment to love one another: 'We must see the whole creation as our neighbor.' (ABC, 1991). Some discourses focus on development, overconsumption and wasting of resources as a threat to creation; one author even refers to this as 'decreation' (McKibben, 1999). Others express a more hopeful vision, posing (like their critics) that development and preserving nature are not incompatible, which is presented as a hope and incentive to improve.

4.2. Problem setting and goal searching

The religious deliberations frame climate change predominantly as a moral and religious-ethical issue. Three specific ethical themes are in the forefront of the discussion: the effects of anthropogenic climate change on nature (as described above), the implications for future generations (intergenerational equity), and the implications for the poor. The latter issue – impacts of climate change on the poor – is the most prominent moral theme in the religious debate. It is usually referred to as 'environmental justice', a matter of social justice. In general public perception, moral issues are highly important as well (Kempton, 1991; Jaeger et al.,

2000; Wardekker, 2004), and all three themes can be found in perception studies (see also e.g. Kempton, 1997; Leiserowitz, 2005, 2006; Lorenzoni and Pidgeon, 2006). However, unlike in the religious discourses, the care for future generations seems to be the most prominent factor (Kempton, 1991) (as is also apparent in 'An Inconvenient Truth'; Wardekker, 2007). The religious sources mention a host of effects that could be negative for humans (the poor and future generations), such as droughts, floods, heat waves, decline in food production, more intense hurricanes, famine, spreading of diseases, more environmental victims and refugees, and increased risk of violent conflict. Some sources also specifically mention negative effects in the United States, e.g. damage and victims due to natural disasters and national security risks due to increases in environmental refugees and conflicts elsewhere.

Effects of climate change on the poor are considered a problem because, as the 'Call to Action' states: 'we are called to love our neighbors, to do unto others as we would have them do unto us, and to protect and care for the least of these' (ECI, 2006). Most sources use the term 'the poor' in a generic way. Often, it seems to be applied to the poor in developing nations (i.e. relating to interregional equity), but sometimes it refers to the poor in the United States as well. Impacts of climate change on developing nations are seen as morally unacceptable, for two reasons. Firstly, the developing nations are harmed, and receive the most severe impacts, through a problem that up till now is caused mostly by the developed nations ('do unto others…'), appealing not only to harming others, but even stronger, to 'the rich' harming 'the poor'. An occasional source adds to this that this harm is done in the process of becoming even richer. Secondly, the statements remark that the developing nations are also the most vulnerable, and the least able to adapt to climate change. The vulnerability argument is also used in reference to the poor in the United States itself. Implications for future generations are seen as reason for concern, as the choices made today determine the world they will live in. Their chances should not be diminished, and the gift of creation should be passed on. Opponents of strict climate policy are present at this level of the debate only to a minor extent. They share the concerns for the poor (and future generations) with proponents of strict policy, but doubt that anthropogenic climate change will pose a significant threat. For as far as there is a problem, that problem is a lack of development, not the impacts of climate change. Developed nations, they state, are better able to adapt to climatic changes and weather extremes, and have more money to spend on the environment as well. The goals of proponents and opponents are very different: one group aims to limit anthropogenic climate change and therefore its impacts, and the other group aims to improve development and therefore increase societies' resilience.

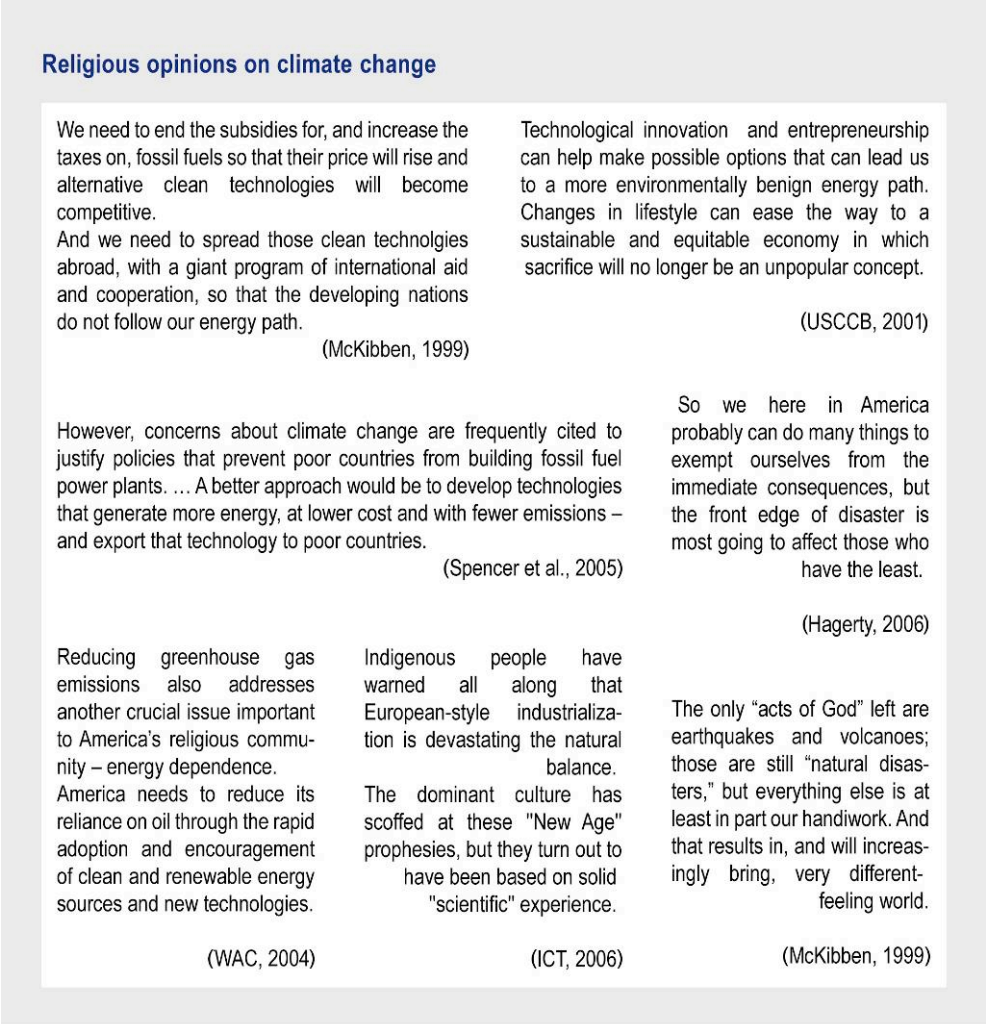

Figure 1. Examples of religious opinions on climate change.

5. Views on the solutions

The second theme of the debate on climate change among religious groups in the United States is how to cope with the issue. As with views on the problem, this question involves both practical matters, such as which policy strategies are deemed useful, as well as more fundamental matters, such as the fairness of these policy strategies and how society in general should respond to climate change.

5.1. Problem solving

The 'Call to Action' and many other sources start their discourse on the solutions with the statement that action is urgent, because impacts already occur and because choices made today fix emissions for some time due to the long life expectancies of technologies. They

present ‘packages’ of policy options, ranging from government regulations, and technological innovation, to adaptation, and behavioural changes.

Many sources, especially opinion documents, press releases, and newspaper articles, present generic ideas, such as energy efficiency, energy from renewable sources, technologies that emit little CO_2, and hybrid vehicles (the latter being a more specific idea that seems popular). Other sources, often more educational documents aimed at their own communities, mention more specific options and present ‘tips’ and ‘success stories’ of e.g. companies, churches, and individuals. With regard to options for governmental action, the recent initiatives mainly point to ‘market based cost-effective mechanisms’ such as ‘cap-and-trade’. The ‘Climate Stewardship and Innovation Act’ (most recently: Lieberman et al., 2007) by Senators McCain and Lieberman in particular is mentioned as a useful and important option. It reduces emissions through ‘a business-friendly cap-and-trade program that would spur investments in energy efficiency and renewable energy, making our U.S. economy more efficient and reducing our dependence on foreign sources of energy’ (EEN, 2005).

Religious communities see an active role for themselves as well. National and regional topical networks and church associations organize public campaigns, e.g. by releasing statements and attracting media attention and by developing commercials, and influence other actors by lobbying among companies and politicians, for example. They also prepare and distribute informational and educational materials on climate change and energy saving to local churches, so they can educate themselves and their members, and urge churches and religious leaders to set a good example. News articles and information documents note that (at least some) local churches have indeed taken this role upon themselves. E.g., the Maine Council of Churches notes: ‘Churches across the state have stepped up to the challenge, carrying out energy audits, organizing special workshops and programs of worship focused on climate change, pledging to reduce their own contributions to global warming and making known their concerns to elected officials and the general public through letters, meetings, and articles in the media.’ (MCC, 2007). Other interesting examples are the ‘What Would Jesus Drive?’ campaign, shareholders initiative ‘Interfaith Center on Corporate Responsibility’, and ‘The Regeneration Project’ with the ‘Interfaith Power and Light’ campaign with many religious green energy suppliers in multiple states (see e.g. Stults, 2006). Opponents of strict policy reject most policy proposals. The best way to cope with climate change, they suggest, is to decrease vulnerability through adaptation, economic development, and if emissions need to be reduced, through technological innovation.

5.2. Outcomes and fairness

The critics of the recent evangelical initiative strongly oppose drastic steps to prevent/limit further climate change, also from the point of view of concern for the poor. These efforts are largely futile, costly, and divert resources from more beneficial uses. In addition, they argue that

strict climate policy will be very harmful for the poor, both in the US and in developing countries. Proponents of strict policy share these concerns, at least to some extent.

Opponents of strict policy note that they have the same motive for action (concern for the fate of the poor) and recognize the other religious initiatives as 'well-intended'. However, they state that 'It matters little how well we mean, if what we do actually harms those we intend to help.' (ISA, 2007). They argue that limiting greenhouse gas emissions, and reducing energy consumption to reach that goal, would require significantly increasing the costs of energy. This would slow economic growth and would also result in increasing prices for other goods and services, including basic necessities such as food, clothing, shelter, and heating/cooling. Furthermore, they pose that a call for strict policy (such as ECI's 'Call to Action') 'asks the poor to give up or at least postpone their claims to modern technology that is essential for a better future for themselves and their children' (Beisner et al., 2006: 14) by resisting the growing use of cheap (fossil) energy and, in general, dealing with developing nations through a form of 'eco-imperialism'. While the wealthy can afford such things, the burden would be borne most heavily by the poor. In the United States itself, their situation would worsen due to increased costs of living on an already limited budget, loss of jobs due to economic downturn, and limitations in using energy for essential things such as heating and air-conditioning (which would reduce their resilience against weather extremes). In developing nations, the poor would be harmed by a less healthy world economy and reduced availability of cheap, reliable energy sources. Their opinions on what could be done to responsibly cope with climate change vary from not obstructing economic growth, by keeping energy inexpensive, and adaptation strategies 'for whatever slight warming does occur' (ISA, 2006), to stimulating economic growth and innovation by promoting sustainable and efficient technologies. 'By exporting advanced technologies, developed nations would improve their environmental quality and enable their people to become wealthier, healthier and safer' (Spencer et al., 2005). Interestingly, the proponents of strict policy share these concerns. E.g.: 'Developing nations have a right to economic development that can help lift people out of dire poverty' (USCCB, 2001), and 'We must make a distinction between the 'luxury emissions of the rich' and the 'survival emissions of the poor'' (Hallman, 2005). They place the responsibility for preventing/limiting further climate change with the developed nations, and suggest limiting the environmental impacts of development – as did the opponents of strict policy - by sharing advanced technologies with the developing nations. Several sources also state that the rich have the responsibility (both on a social and individual level; ECI, 2006) to assist the poor in adapting to climate change. In the US opinion documents, this policy option does not take the foreground, but the notion is supported. On the international level, the World Council of Churches gives considerable attention to adaptation (see e.g. Robra, 2006). Few sources calling for strict policy specifically deal with the consequences of climate policy for the poor in the United States itself, although they are optimistic on the economic effects of policy

and sustainable technology. One source (QEW, 2007) does suggest increasing funds for the Low Income Energy Assistance Program.

6. Discussion and conclusions

The issue of climate change is receiving an increasing amount of attention within religious communities in the United States and in the rest of the world. The Evangelical Climate Initiative's (ECI) 'Call to Action' and its follow-ups are recent examples, and have attracted considerable attention in the media. Calls to politics to take more notice of the issue originate from a multitude of religious convictions and movements. Some opposition to these initiatives exist as well. In the US, several Jewish-Christian groups have organized a counter-initiative to ECI, criticizing its views on climate change and climate policy.

The present study analyzed this debate by looking at published sources, focusing on Judeo-Christian groups in the United States. This limits the analysis mostly to the statements of religious leaders and figureheads on the topics of environment and climate change. An interesting question, however, would be to what extent these views are actually supported by their congregations. E.g. do the same perceptions of the issues of climate change and climate policy live in the religious community as a whole, how large is the group of religiously inspired proponents of strict policy, are there differences in perception between demographical groups (e.g. between urban and rural believers, the latter of whom may already have some type of land ethic), and how do they apply their beliefs in their daily lives? Surveys cited by several sources (e.g. EEN, 2005) show support for climate policy in the religious community, but these are fairly generic. Furthermore, do the awareness raising activities of churches (e.g. being an example, educational activities, etc.) actually result in behavioural changes, and to what extent has this religious debate permeated into entrepreneurial and policy communities? It would also be interesting to study perceptions in other countries and other religions. While no organized religiously inspired opposition to strict policy was found on the international level and a number of other countries that were briefly examined (and this finding was confirmed by other participants in the STT project), that does not mean that such opposition does not exist. Furthermore, how do religious communities in developing and newly industrialized countries, e.g. in Africa, Asia, or Latin America, perceive climate change and attempts to solve this issue (such as climate impacts, biofuel production/plantations, and development in these countries)? The perceptions on climate change among religions such as Islam (especially regarding its large influence in Asia and Africa, and increasing influence in Europe as well) and Hinduism (especially regarding its large influence in growing economies such as India) would be most interesting to study further as well. Harvard University's Forum on Religion and Ecology has performed similar studies on several religions regarding ecology in general in the past.

Religious groups in the United States frame the discussion on climate change and climate policy mainly as an ethical issue. Three specific ethical themes are at the forefront of the debate: the effects of anthropogenic climate change on nature (creation care, or environmental/climate stewardship), the implications for future generations (care for one's children; intergenerational equity), and the implications for the poor (environmental justice; interregional equity among other things). The implications of climate change – and climate policy – for the poor is the dominant theme. Proponents and opponents of strict policy employ the same concepts, images and motives in their discourses, but have very different interpretations of these things. Concerning the effects on nature, proponents state that God created the earth as 'good', and that mankind is part of nature and has the task to preserve this 'garden of God'. Climate change threatens creation and is therefore morally unacceptable. Opponents of strict policy place nature in a more serving position to mankind, who has the task to *turn* the earth into a 'garden'. Concerning implications for the poor, proponents of strict policy argue that the poor (particularly in developing countries) will face the most severe impacts of a problem that the rich have created, while they are the most vulnerable and least able to adapt. Developed nations have the moral duty to prevent this. They suggest various policy strategies, ranging from regulations to technology, adaptation and behavioural change. Recent initiatives favour cap-and-trade schemes in particular. Religious communities take an active role, by setting an example, educating their members and lobbying. Their critics however are concerned about possible negative effects of climate policy on the poor, both in developing nations and in the United States. They fear that the poor will have to bear the heaviest burden of such policies and press for increased resilience through economic (and technological) development instead. Proponents of strict policy share these concerns to some extent, and clearly place the responsibility for action with the developed world. A robust policy strategy (regarding support in the US religious community) would have to pay careful attention to the effects of both climate change and climate policy on the poor in developing countries and the United States itself.

While it remains to be seen what effects this religious debate will have on US climate policy, several aspects make it very interesting. Firstly, the recent initiatives are attracting attention in the media and among scientists, corporations, NGOs, et cetera; secondly, these initiatives do not stand alone; and thirdly, they are actively forming coalitions with these other parties. Calls for more strict policy emerge from many other sectors of society, ranging from politics to corporations, farmers, and 'security hawks' (The Economist, 2007a,b). Coalitions are formed, including between 'unlikely' partners (e.g. joint media campaigns by evangelicals, Fortune 500 companies, and environmental movement; Gunther, 2006). As such, the religious initiatives should not be seen in isolation, but as part as a larger societal debate on climate change, which could lead to greater pressure to participate in international climate policy. And fourthly, religious environmental initiatives seem to be making environmental care accessible to the conservative

side of the political spectrum. Where the conventional environmental movement is highly distrusted among evangelicals/conservatives, these church based initiatives seem to take upon themselves roles similar to environmental groups.

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References

ABC (1991) *American Baptist Resolution on Global Warming*. Valley Forge: American Baptist Churches in the USA.

Beisner, E.C., Driessen, P.K., McKitrick, R. and Spencer, R.W. (2006) *A Call to Truth, Prudence, and Protection of the Poor: An Evangelical Response to Global Warming*. Burke: Interfaith Stewardship Alliance.

Brown, D., Lemons, J. and Tuana, N. (2006) 'The Importance of Expressly Integrating Ethical Analysis into Climate Change Policy Formation,' *Climate Policy* 5: 549-52.

Brown, D.A. (2003) 'The Importance of Expressly Examining Global Warming Policy Issues through an Ethical Prism,' *Global Environmental Change* 13: 229-34.

Bush, G.W. (2007) *State of the Union 2007*. Washington: United States Capitol.

ECI (2006) 'Climate Change – An Evangelical Call to Action'. Dallas: Evangelical Climate Initiative. URL (consulted December 2008): http://christiansandclimate.org/learn/call-to-action/

EEN (1994) 'On the Care of Creation: An Evangelical Declaration on the Care of Creation'. Wynnewood: Evangelical Environmental Network. URL (consulted February 2007): http://www.creationcare.org/resources/declaration.php

EEN (2005) 'Global Warming Briefing for Evangelical Leaders'. Wynnewood: Evangelical Environmental Network. URL (consulted February 2007): http://www.creationcare.org/files/global_warming_briefing.pdf

EEN (2007) 'Frequently Asked Questions'. Wynnewood: Evangelical Environmental Network. URL (consulted February 2007): http://www.creationcare.org/responses/faq.php

Ekklesia (2006) 'Spotlight to Fall on Evangelical Divisions over Climate Change,' *Ekklesia News Brief*, 7 October 2006. URL: http://www.ekklesia.co.uk/content/news_syndication/article_06107is_god_green.shtml

Fischer, F. (1995) *Evaluating Public Policy*. Chicago: Nelson-Hall.

Fischer, F. and Forester, J. (eds) (1993) *The Argumentative Turn in Policy Analysis and Planning*. Durham: Duke University Press.

Gardiner, S.M. (2004) 'Ethics and Global Climate Change,' *Ethics* 114: 555-600.

Gardiner, S.M. (2006) 'A Perfect Moral Storm: Climate Change, Intergenerational Ethics and the Problem of Moral Corruption,' *Environmental Values* 15: 397-413.

Gardiner, S.M. (2007) 'Is Geoengineering the 'Lesser Evil'?' Paper presented at the conference 'Ethics and Climate Change', University of Washington, Washington, 3-4 May 2007.

Gore, A. (2006) An Inconvenient Truth. London: Bloomsbury Publishing (book) and Hollywood: Paramount Classics (movie).

Greeley, A. (1993) 'Religion and Attitudes toward the Environment,' *Journal for the Scientific Study of Religion* 32: 19-28.

Groenenberg, H. and Van der Sluijs, J.P. (2005) 'Valueloading and Uncertainty in a Sector-Based Differentiation Scheme for Emission Allowances,' *Climatic Change* 71 (1): 75–115.

Grubb, M. (2006) 'Seeking Fair Weather: Ethics and the International Debate on Climate Change,' *International Affairs* (Royal Institute of International Affairs 1944-) 71: 463-96.

Gunter, M (2006) 'Strange Bedfellows - Evangelical Christians, FORTUNE 500 Execs and Environmentalists Band Together to Curb Global Warming', CNN.com / FORTUNE, 8 February 2006, URL: http://money.cnn.com/2006/02/08/news/pluggedin_fortune/?cnn=yes

Guth, J., Green, J., Kellstedt, L. and Smidt, C. (1995) 'Faith and the Environment: Religious Beliefs and Attitudes on Environmental Policy,' *American Journal of Political Science* 39: 364-82.

Hagerty, B.B. (2006) 'Evangelical Leaders Urge Action on Climate Change,' National Public Radio, 8 February 2006, URL: http://www.npr.org/templates/story/story.php?storyId=5194527

Hajer, M.A. (1995) *The Politics of Environmental Discourse: Ecological Modernization and the Policy Process.* Oxford: Oxford University Press.

Hajer, M.A. (2005) 'Coalitions, Practices and Meaning in Environmental Politics: From Acid Rain to BSE,' in D.R. Howard and J. Torfing (eds) *Discourse Theory in European Politics*, 297-315. London: Palgrave.

Hallman, D.G. (2005) 'Globalization and Climate Change'. Geneva: World Council of Churches. URL (consulted April 2007): http://www.oikoumene.org/index.php?id=2610

Harden, B. (2005) 'The Greening of Evangelicals - Christian Right Turns, Sometimes Warily, to Environmentalism,' *Washington Post*, 6 February 2005, URL: http://www.washingtonpost.com/wp-dyn/articles/A1491-2005Feb5.html

Harvard-CHGE and NAE (2007) 'An Urgent Call to Action: Scientists and Evangelicals Unite to Protect Creation'. Washington: Harvard Center for Health and the Global Environment, Harvard Medical School, and National Association of Evangelicals. URL (consulted May 2007): http://chge.med.harvard.edu/media/releases/documents/call_to_action.pdf

Hogue, M.S. (2007) 'Global Warming and Religious Stick Fighting,' *Cross Currents* 57 (1): 116-21.

ICT (2006) 'God and Man at NASA: A Change in Climate,' *Indian Country Today*, 10 February 2006.

ISA (2007) 'An Open Letter to the Signers of 'Climate Change: An Evangelical Call to Action' and Others Concerned About Global Warming'. Burke: Interfaith Stewardship Alliance. URL (consulted May 2007): http://www.interfaithstewardship.org/pdf/OpenLetter.pdf

Jaeger, C.C., Kasemir, B., Stoll-Kleemann, S., Schibli, D. and Dahinden, U (2000) 'Climate Change and the Voice of the Public,' *Integrated Assessment* 1: 339-49.

Jamieson, D. (1992) 'Ethics, Public Policy, and Global Warming,' *Science, Technology & Human Values* 17 (2): 139-52.

Jamieson, D. (1996) 'Ethics and Intentional Climate Change,' *Climatic Change* 33: 323-36.

Jørgensen, M. and Phillips, L. (2002) *Discourse Analysis as Theory and Method*. London: Sage.

Kempton, W. (1991) 'Lay Perspectives on Global Climate Change,' *Global Environmental Change* 1: 183-208.

Kempton, W. (1997) 'How the Public Views Climate Change,' *Environment* 39 (9): 12-22.

Knickerbocker, B., (1998) 'Worried Churches Chime In on Global-Warming Debate,' *Christian Science Monitor* 90 (190): 3.

Kolmes, S.A. and Butkus, R.A. (2007) 'Science, Religion, and Climate Change,' *Science* 316: 540-2.

Leiserowitz, A. (2005) 'American Risk Perceptions: Is Climate Change Dangerous?,' *Risk Analysis* 26: 1433-42.

Leiserowitz, A. (2006) 'Climate Change Risk Perception and Policy Preferences: The Role of Affect, Imagery, and Values,' *Climatic Change* 77: 45-72.

Lieberman, J., McCain, J., Lincoln, B., Snowe, O., Obama, B., Collins, S. and Durbin, R. (2007) Climate Stewardship and Innovation Act of 2007. Bill S.280. Washington: The Library of Congress.

Lorenzoni, I. and Pidgeon, N.F. (2006) 'Public Views on Climate Change: European and USA Perspectives,' *Climatic Change* 77: 73-95.

Majone, G. (1989) *Evidence, Argument, and Persuasion in the Policy Process*. New Haven: Yale University Press.

MCC (2007) 'Climate Change – Energy Conservation Makes Good Sense'. Portland: Maine Council of Churches. URL (consulted April 2007): http://www.mainecouncilofchurches.org/climatenew.html

McKibben, B. (1999) 'Climate Change and the Unraveling of Creation,' *Christian Century* 116 (34): 1196-9.

NAE (2007) 'Evangelical, Scientific Leaders Launch Effort to Protect Creation'. Press release, 17 January 2007. Washington: National Association of Evangelicals. URL: http://www.nae.net/index.cfm?FUSEACTION=editor.page&pageID=413&idCategory=1

Nisbet, M.C. (2006) 'Evangelicals: Moral Urgency of Climate Change,' Framing Science blog, 8 February 2006, URL (original no longer available, consulted December 2006): http://web.archive.org/web/20061028060921/http://framing-science.blogspot.com/2006/02/evangelicals-moral-urgency-of-climate.html

Nisbet, M.C. and Mooney, C. (2007) 'Framing Science,' *Science* 316: 56.

QEW (2007) 'Global Climate Change'. Burlington: Quaker Earthcare Witness. URL (consulted April 2007): http://www.quakerearthcare.org/InterestGroups/OtherAreasBeingExplored/ClimateChange

Robra, M., ed. (2006) 'Climate Change'. Geneva: World Council of Churches. URL (consulted May 2007): http://www.wcc-coe.org/wcc/what/jpc/pa-booklet-climate1.pdf

Rolston, H., III (2006) 'Caring for Nature: What Science and Economics Can't Teach Us but Religion Can,' *Environmental Values* 15: 307-13.

Runhaar, H., Dieperink, C. and Driessen, P. (2006) 'Policy Analysis for Sustainable Development: the Toolbox for the Environmental Social Scientist,' *International Journal of Sustainability in Higher Education* 7 (1): 34-56.

Schultz, P.W., Zelezny, L. and Dalrymple, N.J. (2000) 'A Multinational Perspective on the Relation between Judeo-Christian Religious Beliefs and Attitudes of Environmental Concern,' *Environment and Behavior* 32: 576-91.

Singer, P. (2006) 'Ethics and Climate Change: A Commentary on MacCracken, Toman and Gardiner,' *Environmental Values* 15 (3): 415-22.

Sirico, R.A. (1997) 'The New Spirituality,' *The New York Times Magazine*, November 23, 1997.

Spencer, R.W., Driessen, P.K.,and Beisner, E.C. (2005) 'An Examination of the Scientific, Ethical and Theological Implications of Climate Change Policy'. Burke: Interfaith Stewardship Alliance. URL (consulted May 2007): http://www.interfaithstewardship.org/pdf/ISA_Climate_Change.pdf

Stults, M. (2006) 'Religious Groups Becoming a Factor in Climate Policy Debate'. Washington: Climate.org, Climate Institute. URL (original no longer available, consulted April 2007): http://web.archive.org/web/20070407060340/http://www.climate.org/topics/localaction/religion-climate-change.shtml

The Economist (2007a) 'Climate Change - The Greening of America,' *The Economist*, 25 January, 2007.

The Economist (2007b) 'Green America - Waking Up and Catching Up,' *The Economist*, 25 January, 2007.

The Economist (2007c) 'Religion and Environment: a Cross of Green,' *The Economist*, 1 December, 2007.

Toman, M. (2006) 'Values in the Economics of Climate Change,' *Environmental Values* 15: 365-79.

Trevors, J.T. and Saier, M.H. (2006) 'Our Common Biosphere: Climate Change, Wars, Religion and Microbes,' *Water, Air, and Soil Pollution* 171: 1-3.

USCCB (2001) 'Global Climate Change: A Plea for Dialogue, Prudence, and the Common Good'. Washington: US Conference of Catholic Bishops. URL (consulted December 2008): http://www.usccb.org/sdwp/international/globalclimate.shtml

Van der Sluijs, J.P., Risbey, J.S., Kloprogge, P., Ravetz, J.R., Funtowicz, S.O., Corral Quintana, S., Guimarães Pereira, Â., De Marchi, B., Petersen, A.C., Janssen, P.H.M., Hoppe, R. and

Huijs, S.W.F. (2003) *RIVM/MNP Guidance for Uncertainty Assessment and Communication: Detailed Guidance*. Utrecht: Utrecht University and RIVM/MNP.

WAC (2004) 'An Interfaith Call for Global Climate Justice'. Washington: Washington Association of Churches. URL (consulted May 2007): http://www.thewac.org/ClimateJustice.asp

Wardekker, J.A. (2004) *Risk Communication on Climate Change*. Report no. NWS-E-2004-120. Utrecht: Department of Science, Technology, and Society, Utrecht University.

Wardekker, J.A. (2007) *Moral and Religious-Ethical Discourse in Al Gore's 'An Inconvenient Truth'*. Unpublished working paper. Bilthoven: Netherlands Environmental Assessment Agency.

Wardekker, J.A. and Petersen, A.C. (2008) 'Religieuze Posities in het Klimaatdebat in de VS,' in M.D.J. van Well (ed) *Deus et Machina: De Verwevenheid van Technologie en Religie*, 350-9. The Hague: Netherlands Study Centre for Technology Trends (STT).

White, L., Jr. (1967) 'The Historic Roots of our Ecological Crisis,' *Science* 55: 1203-7.

Authors information

Arjan (J.A.) Wardekker

Netherlands Environmental Assessment Agency (PBL), and Department of Science, Technology and Society, Copernicus Institute for Sustainable Development and Innovation, Utrecht University.

Contact address: Arjan Wardekker, Copernicus Institute, Utrecht University, Heidelberglaan 2, 3584 CS Utrecht, The Netherlands. E-mail: J.A.Wardekker@uu.nl.

Arjan Wardekker is researcher at Utrecht University and until November 2007 advisor/researcher at the Netherlands Environmental Assessment Agency. His interests include dealing with risks and uncertainties in environmental policymaking and -advice, particularly risk/uncertainty perception and communication and environmental ethics.

Dr. Arthur C. Petersen

Netherlands Environmental Assessment Agency (PBL).

Contact address: Arthur Petersen, Netherlands Environmental Assessment Agency, P.O. Box 303, 3720 AH Bilthoven, The Netherlands. E-mail: Arthur.Petersen@pbl.nl.

Arthur Petersen is senior researcher and programme manager Methodology and Modelling at the Netherlands Environmental Assessment Agency. His research interests include methodology development for uncertainty assessment and sustainability assessment.

Dr. Jeroen P. van der Sluijs
Department of Science, Technology and Society, Copernicus Institute for Sustainable Development and Innovation, Utrecht University.
Contact Address: Jeroen van der Sluijs, Copernicus Institute, Utrecht University, Heidelberglaan 2, 3584 CS Utrecht, The Netherlands. E-mail: J.P.vanderSluijs@uu.nl.
Jeroen van der Sluijs is senior researcher and assistant professor at Utrecht University and visiting professor at the Centre d'Economie et d'Ethique pour l'Environnement et le Développement, Université de Versailles Saint-Quentin-en-Yvelines, France. He has published on multi-dimensional uncertainty methods, codes for good modelling practice, uncertainty communication and the precautionary principle.

Carvalho, Anabela (ed.) (2008) ***Communicating Climate Change: Discourses, Mediations and Perceptions*****.**
Braga: Centro de Estudos de Comunicação e Sociedade, Universidade do Minho
Available from: http://www.lasics.uminho.pt/ojs/index.php/climate_change

3

Framing climate change in Montreal 2005:
An environmental justice perspective

Mirja Vihersalo

Abstract

This paper is based on my Master's thesis where I discuss climate politics from the perspective of international environmental justice. I examine how climate change is framed as a problem from the point of view of responsibility in the political statements of the Montreal Climate Conference in 2005. I analyse the research data with the help of frame analysis and Perelman's theory of argumentation thus looking for argumentation concerning responsibility, its underlying premises and techniques of argumentation. The results suggest that climate change is framed as a problem in two different ways. In some statements (mainly from developed countries) climate change is considered as a problem of greenhouse gas emissions. Here, describing climate change as a treatable global problem and highlighting economic aspects is typical. In other statements (mainly from developing countries) climate change is represented as a problem of vulnerability and scarce resources. The perspective is local and statements emphasise climate change as a threat to the development efforts of these countries. The premises and techniques of argumentation differ between frames. In addition, there is struggle within frames; both frames encompass different claims about how responsibility should be distributed and what responsibility includes.

Keywords: environmental justice, responsibility, climate politics, Montreal Climate Conference, framing, rhetorical analysis

1. Introduction

In the last few decades a vast scientific and economic literature on climate change has emerged but surprisingly little has been written on ethical dimensions (Brown, 2003: 229). This has also been the case in the Finnish policy and newspaper discussions which have concentrated on the physical and economic aspects of climate change and policies. Yet, as Brown (2003: 229) points out 'because human-induced climate change will most hurt the poorest on the planet, seriously reduce the quality of life for future generations, and threaten plants and animals around the world, global warming must be understood to raise very serious and deep ethical questions'. In this paper, which is based on my Master's thesis, I discuss climate change

and politics from the perspective of environmental justice, which as a broad concept directs attention to how environmental benefits and burdens are distributed among currently living people, among current and future people and among human beings and non-human nature, as well as how their views are taken into account in environmental decision-making. I highlight some aspects of environmental justice more by focusing on one theme in the politics of climate change in particular, namely on responsibility. In addition, I concentrate on the international dimension and distributive justice. Internationally climate change is governed through the United Nations Framework Convention on Climate Change (UNFCCC) and through its legally binding amendment, the Kyoto Protocol. States negotiate these treaties and the future direction of international climate politics in annual Conferences of Parties, where states that have ratified the Convention or Protocol are represented by their delegations. In this paper environmental justice is examined through the Conference of Parties held in Montreal in 2005. The Conference was significant and historical because in addition to being the eleventh Conference of Parties to the United Nations Framework Convention on Climate Change it also served as the first Meeting of Parties to the Kyoto Protocol since it came into force in 16 February 2005. It was one of the most productive conferences as well, and the largest intergovernmental climate conference since the adoption of the Kyoto Protocol in 1997 with some 10000 participants.

As a whole the perspective of my research towards climate politics is a cultural political one. Hajer (1996: 256) speaks of the cultural political approach as a way to ask 'what sort of society is being created in the name of protecting nature'. In other words, environmental policies and discourses also have broader cultural implications. Hence, in this research the perspective directs attention to the ways of speaking about climate change; how it is defined and framed as a problem but also what perspectives of social reality are connected to these definitions (see Haila and Jokinen, 2001: 280). Therefore one purpose is to reveal premises and commitments which operate so that some issues and scenarios seem relevant while alternative scenarios are excluded. A central question in the cultural political approach according to Haila and Jokinen (2001: 281) is also the relation of environmental politics between social and political inequalities.

2. Environmental justice, responsibility and climate politics

2.1. Environmental justice and responsibility

Environmental justice encompasses various different issues. Cases of environmental injustices can be seen everywhere; in the local struggles between forestry and other livelihoods in Finland, in the export of toxic wastes from developed nations to developing as well as in the causes and consequences of climate change. The term 'environmental justice' has its origins in the environmental justice movement developed in the USA, which attracted attention to the connection between race and exposure to environmental risks. The environmental justice movement has broadened to address global issues as well. These range from the exploitation of

commons resources in developing countries to the shifting of environmental pollution from developed to developing countries (Byrne et al., 2002: 8-9). International environmental justice relates mostly to the relationship between developed and developing countries, which has been uneven and imbalanced. Global environmental problems such as climate change, ozone depletion and declining biodiversity have further emphasised the need to focus on the international dimension of environmental justice (Byrne et al., 2002: 9).

Evidently, the notion of environmental justice has been used to advocate various different issues. I follow the suggestion of Ikeme (2003: 200) to consider *environmental justice* as 'the broad, overarching concept encompassing all justice issues in environmental decision-making'. As a theoretical framework I consider environmental justice to encompass distributive and procedural dimensions (see Anand, 2004; Ikeme, 2003; Paavola, 2005, Paavola and Adger, 2006) as well as three justice relations or specific issues of justice (see Lehtinen, 2003; Sajama 2003; Sachs and Santarius, 2007). The *distributive dimension* refers to the distribution of environmental benefits and burdens (see Anand, 2004; Ikeme, 2003) or to the beneficial and adverse effects of environmental decisions or action (Paavola 2005: 312). The *procedural dimension*, on the other hand, refers to participation, being able to influence the decision-making process (Ikeme, 2003: 197-200), and recognition (see Schlosberg, 2004). In other words, the distributive dimension is concerned with outcomes while the procedural dimension is concerned with the way the outcome is attained. The justice relations, on the other hand, refer to the question about community of justice (see Dobson, 1998); among whom environmental benefits and burdens are divided and who are taken into account in procedures. The three justice relations are: the relation between all the human beings in the world living today (*intra-generational justice*), the relation between current and future (as well as precedent) human beings (*intergenerational justice*), and finally the relation between human beings and rest of the nature (*biosphere justice*) (see Lehtinen, 2003; Sajama, 2003; Sachs and Santarius, 2007).

In this paper I focus on the distributive dimension and the intra-generational aspects, and more specifically on international issues within climate politics. I examine environmental justice through the content of responsibility and the distribution of responsibility between states. Justice is thus considered as 'the fair distribution of rights and duties' (Björn, 2003: 24 - translated): justice means that duties or responsibilities are to be divided between parties fairly. But what does responsibility actually mean? One way to define responsibility is 'the actor's power to influence something so that the activity promotes, maintains or violates some values or objectives' (Raitio and Rytteri, 2005: 119). Responsibility can be divided in terms of the dimension of time. Birnbacher (2000: 9-10) distinguishes between ex post and ex ante responsibility; the former is retrospective and refers to answerability of an act or default in the past, whereas the latter is future oriented and refers to obligations and duties. Both aspects are present in climate politics.

2.2. Politics of climate change and environmental justice – distributive justice issues

The distributive dimension of international environmental justice draws attention to the causes and consequences of climate change as well as to mitigation and adaptation policies.

Causes and consequences of climate change

The justice concerns within the causes of climate change refer to the question 'who have caused the problem?' because countries do not release the same amount of greenhouse gas emissions to the atmosphere (Sachs and Santarius, 2007: 183). As Adger (2004: 1712) sees it, 'climate change is a fundamentally unjust burden, an externality from past and present polluters that use the global atmosphere as an open-access resource'. That is, certain countries, businesses and people have contributed to climate change historically as well as at present more than others. In addition, greenhouse gas emissions (at least carbon dioxide emissions) correlate closely with income levels (IPCC, 2001b: 87) and thus considerable emissions mean considerable economic benefits. Internationally compared, in the year 2004 the Annex I countries of the UNFCCC accounted for 46% of global greenhouse gas emissions while their population accounted only for 20% of the world population (IPCC, 2007b: 3). In addition, UNEP has estimated (in Sachs et al., 1998: 72) that between 1800 and 1988 developed countries have produced over 80% of the global increase in the atmospheric carbon dioxide. The intra-generational perspective raises the question whether the atmosphere is considered as a global resource; are everyone equally entitled to it? The intergenerational perspective, on the other hand, makes one to consider the rights of future generations to a healthy atmosphere and environment, but also to ask whether the current generations can be held responsible for the activities of the past generations.

The positive and negative impacts of climate change – ecological, economic, social, cultural, etc. – also raise questions of justice as the distribution of the projected impacts of climate change will not be even. In addition, the way climate change affects countries is at variance with their historical responsibility for these impacts (Ikeme, 2003: 200). Reasons to the uneven distribution are the present climate or location of countries as well as their relative wealth and level of economic and technological development – rich and technologically advanced countries have more capacity to anticipate and to adapt to changes (Pittock, 2005: 120-121). The most vulnerable regions with low adaptive capacity of human systems are Africa, developing countries of Asia, Latin America, and small island states (IPCC, 2001a: 14-17). Economically speaking, impacts will be negative in many developing countries while many developed countries will have both economic gains and losses up to a temperature increase of a few degrees Celsius; this will increase the disparity in well-being between these countries (IPCC, 2001a: 8). Climate change also has ecological impacts. Some species may benefit from climate change and their abundance

or range may increase, but some species will suffer as climate change increases the risk of extinction of some species and loss of biodiversity (IPCC, 2001a: 4-5).

Questions of justice related to the impacts, adaptation and mitigation of climate change are closely connected. An important question is how much warming and how vast impacts will be allowed. The UNFCCC gives an answer to this; the ultimate objective of the Convention is to stabilise 'greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.' (UN/FCCC, 1992: 4) But how effectively will climate change be dealt with and how fast will greenhouse gas emissions be reduced?

Mitigation and adaptation

Climate change mitigation is negotiated and regulated within the UNFCCC and the Kyoto Protocol. Currently the developing or non-Annex I countries do not have emission reduction obligations, whereas the developed or Annex I countries that have ratified the Protocol have agreed to binding emission reductions in the period 2008-2012. However, at some point aggregate emission reductions will be needed as the emission reductions of 1.3 billion people in Annex I countries may become inadequate compared to the growing emissions from 4.7 billion people in non-Annex I countries (IPCC 2001b, 89). How, then, should the burden of mitigation be divided? What would be a just distribution of the atmosphere if the world's absorbing capacity will be taken as the upper limit of greenhouse gas emissions? Thompson and Rayner (1998: 318) discuss three basic ethical positions on distributive issues: 1) egalitarian, 2) contractarian, and 3) libertarian. The *egalitarian perspective* relies on parity; equal shares to all – also in the case of emission rights. Thus the emission permits would be allocated on a per capita basis, and the common suggestions are contemporary and historical per capita allocations. The *contractarian perspective* is based on proportionality where benefits are allocated according to, for instance, contribution or need. Emission rights allocation suggestions are some kind of combinations, for example combining population size, GDP and current emissions. The *libertarian view* calls for allocation based on priority through successful competition. In climate politics this would mean allocating emission rights on the basis of countries' GDP or in proportion to their current emissions; historic emissions would not be added in. Allocation according to this view takes place through markets by preference or the ability to pay.

According to the IPCC's Fourth Assessment Report some warming and impacts will inevitably take place in the future (IPCC, 2007a) and therefore some adaptation will be necessary. The distributive justice implications of adaptation refer to the adaptive responses producing certain positive and negative effects as well as to the scale and distribution of residual climate change

impacts (Paavola and Adger 2006, 597). Here, the main distributive justice dilemmas according to Paavola and Adger (2006, 595 and 597) are the responsibility of developed countries to climate change due to their greenhouse gas emissions, the amount of assistance the developed countries should give to the adaptation of developing countries, the distribution of burden of assistance among developed countries, and the distribution of assistance between recipient countries as well as between adaptation measures.

2.3. Responsibility within climate politics

Responsibility is a concept and a theme often discussed in the literature about justice in the politics of climate change and it is regarded as an important aspect when considering measures against climate change. Ikeme (2003: 200), for instance, sees the distribution of responsibility as a major environmental justice issue in the climate change debate. He does not, however, specify the meaning of responsibility. Responsibility is usually mentioned when discussing historic emissions. For example, Gardiner (2004: 583) discusses responsibility for past emissions and sees it as a justice issue of practical and theoretical importance. Paavola and Adger (2006: 595) and Paavola (2005: 310) consider the question of the responsibility of developed countries for climate change impacts as one of the main justice dilemmas in terms of adaptation to climate change. Adger (2001: 923-924), too, discusses responsibility in this historic sense, but also in relation to current and future activities. He argues that 'Justice within mitigation issues surrounds both the historical responsibility for enhancing atmospheric concentrations of the main greenhouse gases and in allocating present and future responsibility for action' (2001: 923). Distribution of burdens in managing climate change encompasses, for instance, emission reductions (Tóth, 1999: 2). Responsibility is thus something to be shared in relation to current and future mitigation and adaptation policies.

2.4. Framing climate change

How has climate change been constructed and framed as a problem at the international level? And how are countries disposed towards climate change and the justice questions it raises?

In his dissertation, Tirkkonen (2000) discusses discourses within climate politics. According to him (2000: 14-15), the hegemonic climate discourse is based on scientific knowledge about climate change and its management through international environmental politics. Tirkkonen identifies several linkages between the hegemonic climate discourse and ecological modernisation. These are, for instance, the preventive aspects in climate politics, international management of the problem, market centricity and the idea of combining both environmental protection and economy, known as the idea of a positive sum-game (2000: 203-4). Ecological modernisation has become a widespread western environmental discourse (Laine and Jokinen, 2001: 64). In addition to the hegemonic climate discourse, there are also counter and alternative

discourses. The counter discourses in climate politics are: 1) structural discourse which discusses climate change as a deeper global political, moral, economic, and cultural crisis (Wynne, 1994 in Tirkkonen, 2000: 15), and 2) adaptation discourse which emphasises the need to face climate change impacts. Both of these discourses are constructed from the premises of the hegemonic discourse but they question the measures the hegemonic discourse promotes. Instead, the structural discourse would primarily aim at reconstructing unjust economic structures and supporting developing countries, whereas the adaptation discourse would allocate resources to adaptation in order to avoid impacts. In addition, there are two alternative discourses, that is discourses that are not dependent on the framework of the hegemonic discourse. The first one questions the foundations of the hegemonic discourse, either climate change itself as a phenomenon or the grounds of international climate politics, or both. Another alternative discourse frames the concern about climate change as solely power politics or competition on research financing. Tirkkonen maintains that the hegemonic discourse and its counter discourses have grown more powerful, whereas the alternative discourses have become more marginalised (2000: 13-15).

What about the perspectives of countries towards justice and responsibility in the politics of climate change, how do they, then address these questions? Ikeme (2003: 200) discusses environmental justice conceptions of the South and the North that he has identified by a literature survey and argues that their ideas about environmental justice differ. According to him (2003: 200), the developed countries focus on the 'most economically efficient path for minimising climate impact and delivering global ecological health and stability'; emissions are reduced where it is most cost effective and where there are greatest emission reduction opportunities. This also means that the developed countries accept that in terms of costs they should bear greater burden than the poor countries, and that giving resources to the developing countries is accepted, not because of historic emissions, but because of an ethical duty to help the poor, a sense of charity. They put little emphasis on historic emissions and their constraints on the development of developing countries. The developing countries, on the other hand, concentrate on three notions. Firstly, they seek compensatory justice; historical emissions should be taken into account in addressing present entitlements. Secondly, developing countries support the idea of burden sharing based on equal per capita entitlements and thirdly, they also stress procedural justice issues; increased participation in the climate change negotiations. The developed and developing countries thus agree that the developed countries should bear a greater burden for climate protection and that transfer of resources should be allowed to the developing countries although they base their conceptions on distinct reasons and moral positions (Ikeme, 2003: 200- 203).

3. Research design, data and methods

The general purpose of my Master's thesis is to examine climate politics from an environmental justice perspective. In the empirical part I focus on distributive dimension and intra-generational aspects within environmental justice, and more specifically on responsibility from an international viewpoint. My research problem is the following: How is climate change framed as a problem from the point of view of responsibility in the political statements of the Montreal Climate Conference in 2005? This is divided into three research questions:

1) How do different parties perceive the content and distribution of responsibility in climate politics in the statements presented in the Montreal Climate Conference?
2) What are the premises underlying these conceptions?
3) What rhetorical techniques are applied to representing and explaining responsibility in climate politics?

In this paper, I concentrate mainly on the research problem. Figure 1 illustrates the research design in my thesis.

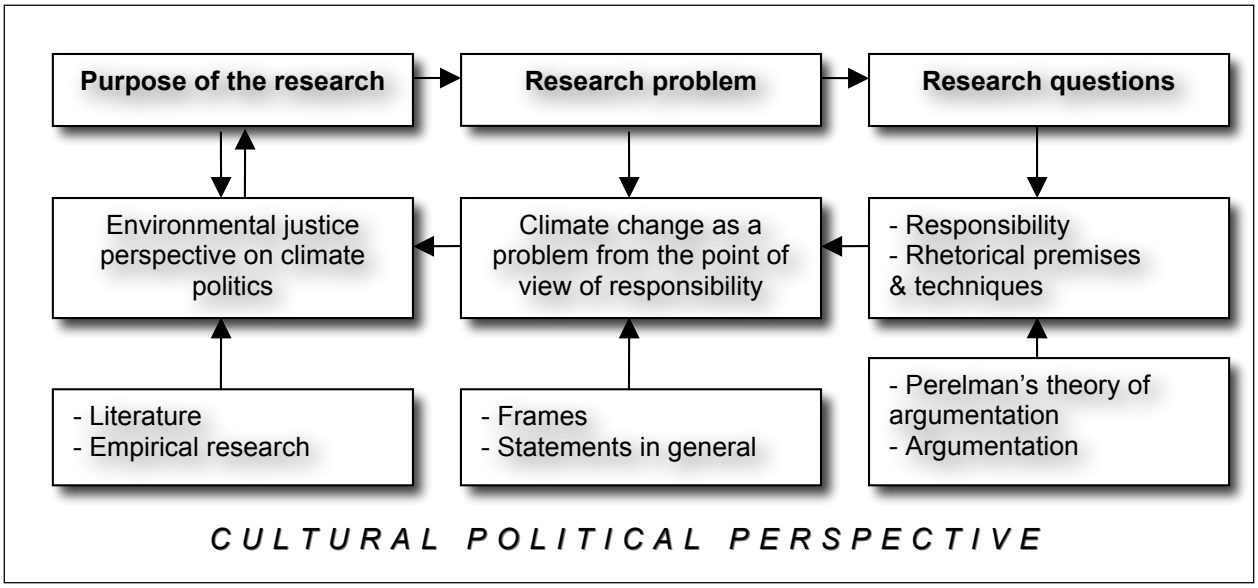

Figure 1. Research design

3.1. Research data and data collection

The research data consists of all the political statements made by Ministers and heads of delegation in the high-level segment of the Montreal Climate Conference in 7-9 December 2005. There are 120 statements in total, comprising statements on behalf of the Group of 77 and China,

the European Union, the Least Developed Countries, the Alliance of Small Island States, and on behalf of the Annex I parties to the Convention that are member states and observer states of the Arctic Council; and 115 individual statements from states that are parties to the either the Convention or both the Convention and the Protocol (81 states). Most of the statements – 81 of them – were from states belonging to non-Annex I parties while 39 statements were from Annex I parties. The statements made by states present the official view and position of the country and thus exclude the diverse voices of, for example, individuals, non-governmental organisations or indigenous peoples. Statements represent the state as one unanimous actor even though the state operates within different policy sectors with diverse and competing objectives and interests as Jokinen (2001: 80-81) notes. Accordingly, statements are compromises.

Data collection

The statements are found as webcast in the web site of the UN Framework Convention on Climate Change (www.unfccc.int). I listened to the statements and transcribed them. After having transcribed all the statements, I still listened to them once more to revise and to make corrections to the texts. In total there were 118 sheets of data, that is about 1 sheet per statement. The fact that some of the statements were interpreted in English at the Conference might have changed some of the original meanings and emphasis. However, the analysis of the data is based on general and recurrent findings, not on individual words, phrases or ideas. Before using the actual research methods I studied and processed the data with Atlas.Ti.

3.2. Research methods: rhetorical analysis and frames

Rhetorical analysis and Perelman's theory of argumentation

I use rhetorical analysis in the sense of discussing 'how some versions of reality strive to present themselves as convincing and acceptable, and how the listeners, readers or interlocutors are made to commit themselves to them' (Jokinen, 1999: 126 - translated). I employ the concepts and tools developed around the new rhetoric of Chaïm Perelman which discusses the general principles of making claims credible and worth of committing oneself to as well as different techniques of argumentation (Summa, 1995: 76-77). There are three central aspects in the new rhetoric of Perelman: 1) the relationship to the audience, 2) the premises of argumentation and 3) the techniques of argumentation (Tuulentie, 2001: 45; Kuusisto, 1996: 275-88; Summa, 1995: 77-84). The first aspect, the speaker's relationship to the audience, means that argumentation is essentially argumentation for someone (Jokinen, 1999: 128). The second aspect, the premises of argumentation, refers to some areas of unanimity between the speaker and the audience on which the speaker can base the justifications of argumentation; they are one means of constructing convincing claims (Summa, 1995: 78 and 1996: 69). The premises are the basis of argumentation that can be taken for granted. Perelman distinguishes between *premises that*

relate to reality and *premises that relate to preference or preferable*. The former refers to facts, truths and presumptions, which are associated with the idea of normality, whereas the latter refers to values, hierarchies and the locus of the preferable (Perelman, 1982: 23). The third aspect, the techniques of argumentation, discusses also the ways to convince an audience. Whereas the premises can be regarded as already accepted general justifications, the techniques of argumentation aim at justifying certain conclusions (Summa, 1995: 80). Perelman distinguishes between *arguments that are given in the form of a liaison* which 'allows for the transference to the conclusion of the adherence accorded the premises' and *arguments in the form of dissociation* which 'aims at separating elements which language or a recognised tradition have previously tied together' (Perelman, 1982: 49), that is, the course of argumentation is either associative or dissociative (Summa, 1995: 81). I focus on the second and third aspects of Perelman's theory.

Frames as methodological and interpretative tools

In sociological research the concept of 'frame' comes from Erving Goffman (1974) who used frames in the meaning of schemes of interpretation through which people observe, recognise and name different events and activities; frames give sense and meaning to these events (Väliverronen, 1996: 106). The idea of diversity is essential; in most events many issues take place simultaneously, and people may also interpret and frame the same event in different ways (Horsti, 2005: 49). Goffman and others have used frame analysis to examine the interaction of people face to face in different situations. However, it has also been applied in a broad sense to the research of social problems and movements, to journalism (Väliverronen, 1996: 108) as well as to the research of environmental social science. In this research frames are essentially practical methodological and interpretative tools for answering my research problem: 'how climate change is framed as a problem from the point of view of responsibility'. Frames as a methodological device resemble the concepts of discourse or interpretative repertoire (Saaristo, 2000: 43). The idea is that climate change is not the same kind of problem for every state, but there are different versions of it, which emphasise but also leave out different questions and measures. A frame thus embodies a shared understanding about climate change as a problem, but also more broadly a shared understanding about what is the preferred social world and values within it. The frames in this research, as with Väliverronen (1996: 111), are the result of concrete empirical research, not the basis of it.

3.3. Analysis of data

During the analysis and interpretation I concentrated on two main issues when reading the statements. First, I considered how climate change is discussed by the states in general; how climate change is framed as a problem. As I started to be familiar with the research data, I began to distinguish roughly two ways of describing and speaking about climate change. Framing thus

encompasses reading the statements as a whole. The research problem is answered partly with the research questions and partly with the other aspects of the statements, and the most prevalent and important features of these are included in the frames to shape more generalised ideas about climate change as a problem. The frames hold shared ways to speak of, understand, construct and justify the problem. However, the frames can also contain different claims about responsibility.

Secondly, in order to answer the research questions I searched for argumentation concerning responsibility in climate politics. Claims concerning the content and distribution of responsibility answer my first research question. For the second and third research questions, I analysed what kind of premises underlie these claims and what kind of justifications support them. The premises and the techniques of argumentation are salient in how arguments are presented as credible, but they also construct climate change as a problem. I further grouped these claims (and thus states) according to their content into coalitions.

Figure 2 represents the analytical framework which I used when reading and analysing the research data. This figure is inspired by a figure presented by Perimäki (2001: 5) in her study about the actors and arguments in the Finnish climate politics (see also Best, 1987: 102 for a figure similar to Perimäki's). The figure connects the social context or rhetorical situation (see Kakkuri-Knuuttila 1998: 234-35) with the aspects of argumentation as understood by Perelman.

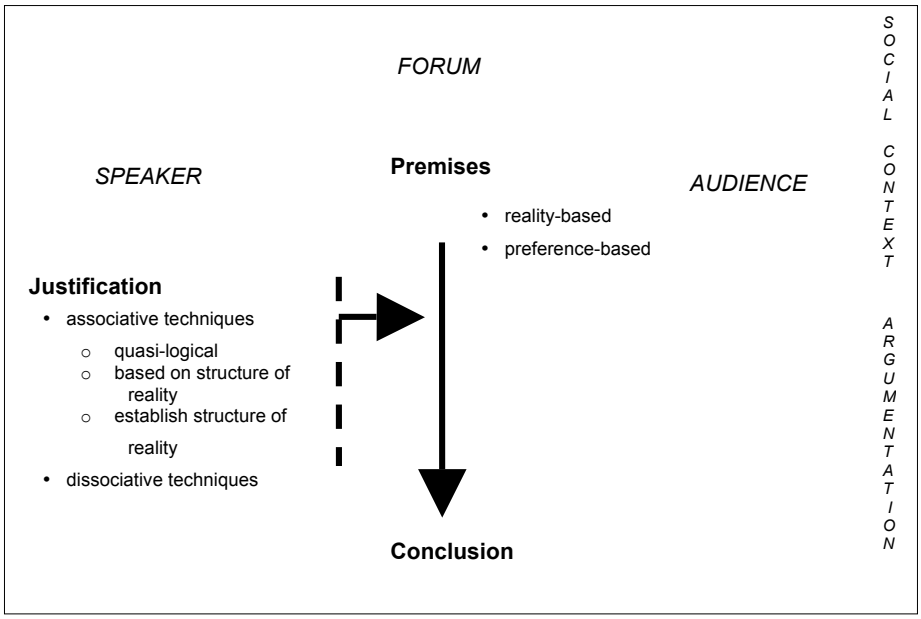

Figure 2. Analytical framework: social context and argumentation

The forum, the speaker, and the audience refer to the social context of the statements, the rhetorical situation. The *forum of the rhetorical situation* is Montreal Climate Conference and the

speakers of the rhetorical situation are the Ministers and heads of delegations representing the states. There were about 9500 participants in total in the Conference of which 2800 were members of official delegati

ons (Berghäll, 2005: 5). This is the concrete *audience of the rhetorical situation*. However, the concept of audience is not restricted to the audience in attendance, as the audience can be global through the media. The speaker and the audience also relate to the first aspect of Perelman's theory, the relationship to the audience. The premises are the second aspect in Perelman's theory. They can be either reality based - premises that relate to reality -, or preference based - premises that relate to preference or preferable. Justification refers to the third aspect of Perelman's theory - the techniques of argumentation which are divided into associative (quasi-logical arguments, arguments that are based on the structure of reality, and arguments which establish the structure of reality) and dissociative techniques. The conclusion refers to the claim.

4. Results

The results suggest that from the point of view of responsibility climate change is framed as a problem in two different ways: in some statements climate change is considered as a problem of greenhouse gas emissions while in other statements climate change is discussed as a problem of vulnerability. Within these frames, however, there are different perspectives about responsibility for the problem.

Climate change as a problem of greenhouse gas emissions

Climate change is considered as a problem of greenhouse gas emissions from the point of view of responsibility in the statements of the developed countries and most countries with economies in transition, that is Annex I parties, as well as in the statement of China. Climate change is seen as a treatable problem, which can be managed. Climate change is mostly discussed from a global perspective; it is seen as a shared, global problem with global impacts. Typical of this frame is also the role of technology in dealing with the problem; new environmentally friendlier technologies are considered as the solution to emission reductions. Some statements also discuss a more profound change as a solution – disconnecting emissions from economic growth in general with the development of societies towards a path similar to ecological modernisation; economic growth without environmental harms with the help of technology. Market mechanisms and the flexible mechanisms of the Kyoto Protocol are expected to deliver these changes. Economic discourse plays an important role in the statements, too. The premises in the claims concerning responsibility refer largely to economic motives such as lower costs, creating jobs, producing economic growth, etc. Economic reasoning in climate change activities is common; for instance, not acting against climate change is seen to be more

expensive than acting. Furthermore, climate change measures or environmentally friendlier activities are seen as compatible with economic growth or they are even considered to generate economic growth.

Typical of this frame is reality-based premises underlying the claims. The most common of these premises refer to factual issues (obviousness and scientific results) and to economic motives (lower costs, signal to markets). Characteristic is also justifying claims with metaphors such as journey (Kyoto first step, path to further reductions, move forward, etc.), which describes current commitments as only the beginning and that much more needs to be done. In addition, the metaphors of war (battle against climate change, combating climate change, etc.) and world (world needs, world expects, world action, etc.), which construct climate change as a problem that is global and common to all and create unity among nations, are typical features. Commonly used dissociative techniques suggest that the current commitments from the developed countries alone are not enough to address climate change or that there is no conflict between growth and environmental protection or that climate change is both a challenge and an opportunity.

The argumentation concerning responsibility within this frame is future oriented. There is, however, disagreement in two issues: 1) what is the relation of economy and climate change activities, and 2) how to share the burden of mitigation. In the first question there are two alliances that both highlight economic aspects and speak in favour of economic development, but dissent in whether climate change is compatible with the objective of economic growth. The USA, Australia and China claim that activities to combat climate change should enhance economic development. By saying this they reserve the option to withdraw from negotiations that deal with activities that they see harmful or neutral to their economy. On the other hand Canada, Japan and a group of European countries emphasise that climate change is compatible with economic growth, and that the economy may actually benefit from reacting to climate change. By claiming this, these countries try to nullify the argumentation of those not willing to participate in climate change activities on the grounds of economic reasons. As a consequence, the values and the moral responsibility within this frame refer to development, especially to the economic development of societies. Either countries' economic development cannot be endangered due to climate policies or economic development and addressing climate change are realised together. In the second question about the burden-sharing of future mitigation there are three distinctive groups. Canada, Japan and a group of European countries claim that the developed countries are mostly responsible for mitigation but the developing countries also need to participate increasingly; the current mitigation responsibilities of the developed countries is not enough. Russia, New Zealand and some European countries see also that mitigation is a global responsibility but that countries should contribute the best they can according to their capabilities and amount of current emissions. In consequence, most of the statements refer to global mitigation, or at least more global than currently. While developed countries have the main

responsibility, developing countries, especially the emerging ones with more capabilities and emissions, also need to participate increasingly. Besides the aforementioned argumentation, there are also individual claims concerning the distribution of responsibility; those of China, USA and Australia. China demands that states should honour the basic principles of the UNFCCC, especially that of common but differentiated responsibilities, which China sees to be reflected well in the Kyoto Protocol. In contrast, the statements of the USA and Australia do not consider responsibilities under the Kyoto Protocol. Australia calls for a framework that enables effective action from all major emitting countries while the USA relies on voluntary action by partnerships between all countries.

Climate change as a problem of vulnerability

Climate change is also discussed from another perspective: in the statements of most developing countries it is framed as a problem of vulnerability from the point of view of responsibility. Whereas the global aspects were highlighted in the first frame, this frame does the opposite by discussing climate change from a local perspective. Thus the statements emphasise environmental, social and economic impacts to their countries or to developing countries in general by describing local climatic hazards amply. Focusing on the social and economic development endeavours and challenges is also common within this frame. Climate change is described as a threat to the social and economic development efforts of the developing countries because of their low capacities required to anticipate, react or to adapt to the impacts. Furthermore, climate change is considered to reduce even more their scarce resources and thus hinder poverty eradication and solving other major problems the developing world is facing. Attaining the Millennium Development Goals is also regarded as difficult due to the additional burden of climate change. The premises of argumentation also highlight these aspects by referring to the development of developing countries (Millennium Development Goals, sustainable development, poverty eradication, etc.). In addition, the premises include issues such as vulnerability, low adaptive capacities and specific circumstances of the developing countries. Another characteristic feature is that financial and technological resources are considered as the means to solve the problem, to strengthen the capabilities of developing countries and thus reduce their vulnerability. Consequently, financial aid and transfer of technology are emphasised, and the statements call for assistance from the developed countries. Regardless of this, many states describe themselves as active in developing climate change measures. Adaptation to climate change is also seen as essential.

Characteristic of this frame is that the premises in the claims are preference-based. Most of these premises refer to vulnerability, low adaptive capacities, and specific circumstances or adaptation needs of the developing countries. The most common reality-based premises can be summarised as development, including poverty eradication, Millennium Development Goals and

sustainable development. It is also typical to justify claims by referring to some Article of the Convention or the Kyoto Protocol as well as by using dissociative techniques implying that the Annex 1 countries are not really meeting their emission reduction commitments or their promises of technical and financial assistance.

The argumentation concerning responsibility within this frame is mostly future oriented but also discuss past and current responsibilities. The states seem to agree on some questions: there is a quite general tone noticeable in the statements handing the main responsibility over to the developed countries. Also the idea that the developed countries have not assumed their responsibilities in giving resources nor in emissions reductions is shared in the statements. There is, however, different kinds of emphasis and diverse perspectives on two issues: 1) how to support the development of developing countries, and 2) how to share the burden of mitigation. There are two ideas about what to do with the first question. On the one hand, many countries call for environmentally friendly technologies and financial resources to be made available for the developing countries. Some OPEC-countries, on the other hand, see that using fossil fuels should be continued with the help of carbon capture and storage because the development prospects of OPEC-countries suffer from selective climate policies. Both views involve the developed countries: it is them who should give resources or reduce emissions in different ways. Regarding the second question about the burden-sharing of future mitigation there are three distinctive suggestions. A group of G-77 countries, a number of which are also least developed countries, see that while more efforts are needed from all, binding emission reductions are acceptable only from Annex I countries. Other G-77 countries, on the other hand, distribute responsibility on the basis of common but differentiated responsibilities, amount of emissions, capabilities and resources. A few states consider that developing countries can have the possibility of taking voluntary commitments if it supports sustainable development and does not limit their economic and social development. .

5. Discussion

The assumption of this research was that climate change is essentially considered as an environmental problem and that this aspect would be visible in the research data. However, the statements highlighted other aspects much more; climate change was described as an economic or as a developmental problem of current human beings. The role of environment both in the statements in general and as justification was minor. Climate change was also discussed very distinctively and framed as a problem in two very different ways. In addition, the premises of argumentation differ clearly between these two frames. However, it is interesting that although the perspectives and justifications of these frames were very different, the claims concerning the distribution of responsibility themselves were somewhat alike. There were also other similarities between the two frames. First, both considered technology to be the answer to the problem.

Secondly, climate change was seen as a problem that the existing politics and structures are able to manage; only one statement questioned the purpose of economic growth and current development. Climate change was thus not seen as a symptom of something bigger which would need structural, value and life-style changes. What was missing in the statements were the concrete targets and objectives. Furthermore, except for EU members, countries do not consider a specific time-frame in which climate change should be addressed; the EU countries discuss a 2 Degrees Celsius limit to warming but do not address the impacts this amount of warming would have on different regions and the environment. From the perspective of environmental justice it is peculiar that historical responsibility does not get more room as a justification of developing countries. In addition, only some statements demanded emission reductions of the USA and Australia within both of these frames. It is also noteworthy that the rights of future generations were not considered more and their role as justification was quite small. Furthermore, the environment itself and animal and plant species – or even the environment as natural resources – was largely absent, and it would be interesting to examine its position in climate change negotiations more. In the future there is also a need to transcend the developed-developing country divisions, which I had to use in this research, and instead describe international climate politics with the help of fresh and more meaningful groupings.

References

Adger, W.N. (2004) 'Commentary: Right to Keep Cold,' *Environment and Planning A* 36 (10): 1711-15.

Adger, W.N. (2001) 'Scales of Governance and Environmental Justice for Adaptation and Mitigation of Climate Change,' *Journal of International Development* 13 (7): 921-31.

Anand, R. (ed.) (2004) *International Environmental Justice: a North-South Dimension*. Aldershot: Ashgate.

Berghäll, O. (2005) 'Yhteenveto: Istuntojen Yleinen Kulku ja Tulokset.' In *Suomen Valtuuskunnan Loppuraportti: YK:n Ilmastosopimuksen Osapuolikonferenssin 11. istunto (COP11), Kioton Pöytäkirjan Osapuolikokouksen 1. istunto (COP/MOP1) sekä Sopimuksen ja Pöytäkirjan Alaelinten 23. istunnot*, 5-16. URL (consulted January 2008): http://www.ymparisto.fi/default.asp?node=9620&lan=fi.

Best, J. (1987) 'Rhetoric in Claims-Making: Constructing the Missing Children Problem,' *Social Problems* 34(2): 101-21.

Birnbacher, D. (2000) 'Philosophical Foundations of Responsibility,' in A. E. Auhagen, and H.-W. Bierhoff (eds) *Responsibility: The Many Faces of a Social Phenomenon*, 9-22. London: Routledge.

Björn, I. (ed.) (2003) *Ympäristöpolitiikka Metsässä*? Joensuu: Joensuun yliopisto.

Brown, D.A. (2003) 'The Importance of Expressly Examining Global Warming Policy Issues Through an Ethical Prism,' *Global Environmental Change* 13 (4): 229-34.

Byrne, J., Martinez, C. and Glover, L. (2002) 'A Brief on environmental Justice,' in J. Byrne, L. Glover and C. Martinez (eds) *Environmental Justice: Discourses in International Political Economy*, 3-17. London: Transaction Publishers.

Gardiner, S. M. (2004) 'Ethics and Global Climate Change,' *Ethics* 114(3): 555-600.

Haila, Y. and Jokinen, P. (2001) 'Tulkintoja Ympäristöpolitiikasta,' in Y. Haila and P. Jokinen (eds) *Ympäristöpolitiikka: Mikä Ympäristö, Kenen Politiikka*, 273-89. Tampere: Vastapaino.

Dobson, A. (ed.) (1998) *Justice and the Environment: Conceptions of Environmental Sustainability and Dimensions of Social Justice*. New York: Oxford University Press.

Hajer, M. A. (1996) 'Ecological Modernisation as Cultural Politics,' in S. Lash, B. Szerszynski and B. Wynne (eds) *Risk, Environment and Modernity: Towards a New Ecology*, 246-68. London: Sage.

Horsti, K. (ed.) (2005) *Vierauden Rajat: Monikulttuurisuus ja Turvapaikanhakijat Journalismissa*. Tampere, Tampere University Press. Acta Electronica Universitatis Tamperensis 471.

Ikeme, J. (2003) 'Equity, Environmental Justice and Sustainability: Incomplete Approaches in Climate Change Politics', *Global Environmental Change* 13 (3): 195-206.

IPCC (2001a) 'Summary for policymakers,' in J.J. McCarthy, O. F. Canziani, N. A. Leary, D. J. Dokken and K. S. White (eds) *Climate change 2001: Impacts, Adaptation and Vulnerability. A Report of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change*, 1-17. Cambridge: Cambridge University Press. URL (consulted January 2008): http://www.grida.no/climate/ipcc_tar/wg2/pdf/wg2TARspm.pdf

IPCC (2001b) 'Setting the Stage: Climate Change and Sustainable Development,' in B. Metz, O. Davidson, R. Swart and J. Pan (eds) *Climate change 2001: Mitigation. A Report of Working Group III to the Third Assessment Report of the Intergovernmental Panel on Climate Change*, 73-114. Cambridge: Cambridge University Press. URL (consulted January 2008): http://www.grida.no/climate/ipcc_tar/wg3/pdf/1.pdf.

IPCC (2007a) 'Summary for policymakers,' in S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds) *Climate change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, 1-18. Cambridge: Cambridge University Press. URL (consulted January 2008): http://www.ipcc.ch/SPM2feb07.pdf.

IPCC (2007b) 'Summary for policymakers,' in B. Metz, O.R. Davidson, P.R. Bosch, R. Dave and L.A. Meyer (eds) *Climate change 2007: Mitigation of Climate Change. Contribution of Working*

group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate, 1-23. Cambridge: Cambridge University Press. URL (consulted January 2008): http://www.ipcc.ch/SPM040507.pdf.

Jokinen, A. (1999) 'Vakuuttelevan ja Suostuttelevan Retoriikan Analysoiminen,' in A. Jokinen, K. Juhila and E. Suoninen (eds) *Diskurssianalyysi Liikkeessä*, 126-59. Tampere: Vastapaino.

Jokinen, P. (2001) 'Ympäristöhallinto Poliittisena Toimijana,' in y. Haila and P. Jokinen (eds) *Ympäristöpolitiikka: Mikä Ympäristö, Kenen Politiikka*, 78-89. Tampere: Vastapaino.

Kakkuri-Knuuttila, M.-L. (1998) 'Retoriikka,' in M.-L. Kakkuri-Knuuttila (ed.) *Argumentti ja Kritiikki: Lukemisen, Keskustelun ja Vakuuttamisen Taidot*, 233-72. Tampere: Gaudeamus.

Kuusisto, R (1996) 'Sodan Retoriikasta: Persianlahden ja Bosnian Konfliktit Läntisten Suurvaltajohtajien Lausunnoissa,' in K. Palonen and H. Summa (eds) *Pelkkää Retoriikkaa*, 267-91. Tampere: Vastapaino.

Laine, M. and Jokinen, P. (2001) 'Politiikan Ulottuvuudet,' in Y. Haila and P. Jokinen (eds) *Ympäristöpolitiikka: Mikä Ympäristö, Kenen Politiikka*, 47-65. Tampere: Vastapaino.

Lehtinen, A. (2003) 'Johdanto: Ympäristö, Yhteisö ja Oikeudenmukaisuus,' in A. Lehtinen and P. Rannikko (eds) *Oikeudenmukaisuus ja Ympäristö*, 9-31. Helsinki: Gaudeamus.

Paavola, J. (2005) 'Seeking Justice: International Environmental Governance and Climate Change,' *Globalisations* 2 (3): 309-22.

Paavola, J. and W. N. Adger (2006) 'Fair Adaptation to Climate Change,' *Ecological Economics* 56 (4): 594-609.

Perelman, C. ed. (1982) *The Realm of Rhetoric*. Notre Dame: University of Notre Dame Press.

Perimäki, A. (2001) *Suomalaisen Ilmastokeskustelun Toimijat ja Argumentit*. University of Tampere, Publications of Department of Regional Studies and Environmental Policy. URL (consulted January 2008): http://www.uta.fi/laitokset/yhdt/artikkelit/2001_ilmasto.pdf.

Pittock, A. B. (2005) *Climate change: Turning Up the Heat*. London: Earthscan.

Raitio, K. and Rytteri, T. (2005) 'Metsähallituksen ja Valtio-omistajan Vastuu Ylä-Lapin Porotalouden ja Metsätalouden Välisessä Kiistassa,' *Metsätieteen aikakauskirja* 12 (2): 117-37.

Saaristo, K. (2000) *Avoin Asiantuntijuus: Ympäristökysymys ja Monimuotoinen Ekspertiisi*. Jyväskylä: Jyväskylän yliopisto.

Sachs, W. and Santarious, T. (eds) (2007) *Fair Future: Resource Conflicts, Security and Global Justice. A Report of the Wuppertal Institute for Climate, Environment and Energy.* London: Zed Books.

Sachs, W., Loske, R. and Linz, M. (1998) *Greening the North: a Post-Industrial Blueprint for Ecology and Equity*. London, Zed Books.

Sajama, S (2003) ’Mitä Oikeudenmukaisuus On ja Miten Se Liittyy Ympäristöön?,’ in A. Lehtinen and P. Rannikko (eds) *Oikeudenmukaisuus ja Ympäristö*, 74-89. Helsinki: Gaudeamus.

Schlosberg, D. (2004) ‘Reconceiving Environmental Justice: Global Movements and Political Theories,’ *Environmental Politics* 13 (3): 517-40.

Summa, H. (1995) ’Retoriikka ja Argumentaatioanalyysi Yhteiskuntatutkimuksessa,’ in J. Leskinen (ed.) *Laadullisen Tutkimuksen Risteysasemalla*, 67-89. Helsinki: Kuluttajatutkimuskeskus.

Summa, H. (1996) ’Kolme Näkökulmaa Uuteen Retoriikkaan: Burke, Perelman, Toulmin ja Retoriikan Kunnianpalautus,’ in K. Palonen and H. Summa (eds) *Pelkkää Retoriikkaa*, 51-83. Tampere: Vastapaino.

Thompson, M. and Rayner, S. (1998) ‘Cultural discourses,’ In S. Rayner and E. L. Malone (eds) *Human Choice and Climate Change: Volume 1 The Societal Framework*, 265-343. Ohio: Battelle Press.

Tirkkonen, J. ed. (2000) *Ilmastopolitiikka ja Ekologinen Modernisaatio: Diskursiivinen Tarkastelu Suomalaisesta Ilmastopolitiikasta ja sen Yhteydestä Metsäsektorin Muutokseen*. Acta Tampere: Tampere University Press. Acta Universitatis Tamperensis 781. URL (consulted January 2008): http://acta.uta.fi/pdf/951-44-4964-9.pdf.

Tóth, F. L. (1999) ‘Fairness Concerns in Climate Change,’ in F. C. Tóth (ed.) *Fair Weather: Equity Concerns in Climate Change*, 1-10. London: Earthscan Publications.

Tuulentie, S. ed. (2001): *Meidän Vähemmistömme: Valtaväestön Retoriikat Saamelaisten Oikeuksista Käydyissä Keskusteluissa*. Helsinki: Suomalaisen Kirjallisuuden Seura.

UN/FCCC (1992) United Nations Framework Convention on Climate Change. http://unfccc.int/resource/docs/convkp/conveng.pdf

United Nations Climate Change Conference. URL (consulted January 2008): http://unfccc.int/meetings/cop_11/items/3394.php. (March 2007)

Väliverronen, E. ed. (1996) *Ympäristöuhkan Anatomia*. Jyväskylä: Vastapaino.

Author information

Mirja Vihersalo. Researcher, Faculty of Social Sciences, University of Lapland, Finland. PL 122 96101 Rovaniemi, Finland. E-mail: mirja.vihersalo@ulapland.fi.

The author is starting her PhD on the EU’s climate politics from the perspective of environmental citizenship.

Carvalho, Anabela (ed.) (2008) ***Communicating Climate Change: Discourses, Mediations and Perceptions*****.**
Braga: Centro de Estudos de Comunicação e Sociedade, Universidade do Minho
Available from: http://www.lasics.uminho.pt/ojs/index.php/climate_change

2

Stakeholder dialogue as a communication and negotiation tool in scientific inquiry

Anne Cristina de la Vega-Leinert and Dagmar Schröter

Abstract

A stakeholder dialogue aimed to facilitate the development and dissemination of the ATEAM European vulnerability assessment of global change impacts. This participative experiment constitutes a milestone in integrated ecological modelling. Participating ecosystem managers, sectoral representatives and policy advisers significantly influenced the research content and process. The usefulness of the projects' outcomes for stakeholders and an evaluation of the dialogue are presented.

Three challenges are highlighted. First, the increasing complexity and uncertainty of global change modelling and the multiplication of its results raise the question of how to best communicate modelling outcomes to society. Second, scientifically credible and socially relevant participative research implies the need for transparency in the research process, so that goals, underlying assumptions and methods of scientific inquiry may be adequately scrutinised and debated. Finally, stakeholder dialogues are valuable processes of negotiation, which may help to reconcile the differing needs of fundamental and applied global change sciences.

Keywords: science-stakeholder dialogue, participative research, ecosystem modelling, global change, vulnerability assessment

1. Introduction

The present paper focuses on communication between scientists and societal actors *during* participatory research on climate change. This includes two main domains: 1) communication on climate change and, 2) communication on the research itself. If the former emphasises the content, the latter focuses on the form and the process the research takes.

Science-stakeholder dialogues have been defined as a 'structured communicative process of linking scientists with selected actors that are relevant for the research problem at hand' (Welp et al., 2006a). This approach, among other participative research methods, has become important in

the last two decades in a range of academic fields. The underlying rationale is closely related to a paradigm-shift in science epistemology, namely the post-normal paradigm (Funtowicz and Ravetz, 1993). For these authors, a scientific domain such as climate change science is characterized by the universal scale of the processes it studies and their long-term impacts, and the intricate interactions between natural and human systems. A typical positivistic, deductive, quantitative approach reaches its limits in such complex issues. *Alone* 'normal' science is unable to bring society critical answers due to: intractable cumulative uncertainty, which makes predictions impossible; critical ethical and political dilemmas, for which a range of valid, often conflicting societal perspectives exist; and finally the high stakes these value-laden issues are associated with, which demand urgent societal debate and decisions. One of the methods of the proposed 'post-normal' science is to involve societal actors in the research process to satisfy a series of goals. These range from data collection methods, where stakeholders are invited to share their knowledge and information, to fully participative exercises, where scientists and stakeholders become partners and jointly decide the research scope (Welp et al., 2006a, b).

This paper presents and discusses insights gained during the science-stakeholder dialogue exercise implemented within ATEAM (Advanced Terrestrial Ecosystem Assessment and Modelling). This EU framework 5 research project officially run from 2001 to 2004 and was coordinated from the Potsdam Institute for Climate Impacts Research, Germany. Its overarching goal was to produce maps of European impacts and vulnerability to global change, explicitly conceived and implemented with policy-makers and environmental managers in mind (Metzger et al., 2008; Schröter et al., 2005). For this purpose a stakeholder dialogue initiative was embedded in the research process. This experience profoundly affected the way participating scientists designed and performed their work and constitutes a milestone in integrated ecological modelling for the purposes of global change impact and vulnerability assessments. The underlying hypothesis is that stakeholder dialogue, and participative methods in general, play a valuable role in the elaboration and evaluation of complex global change models, which may be both scientifically credible and socially relevant.

First, the overall project and the stakeholder dialogue are presented. The stakeholders' selection criteria, including biases, are discussed. Second, stakeholders' influence on the research is summarised. Finally, the dialogue content and process are discussed in terms of their relevance for participating stakeholders and scientists.

2. Overall aims of the ATEAM and the stakeholder dialogue

ATEAM aimed at assessing quantitatively the vulnerability[1] of human sectors (i.e. agriculture, forestry, water, biodiversity, mountain tourism, and carbon-storage potential) to global change.

[1] The degree to which an ecosystem service is sensitive to global change combined with the degree to which the sector that relies on this service is unable to cope with the change.

Since it was primarily an ecosystem modelling project its entry point to vulnerability was through the possible impacts on ecosystem services[2], such as wood production and snow availability.

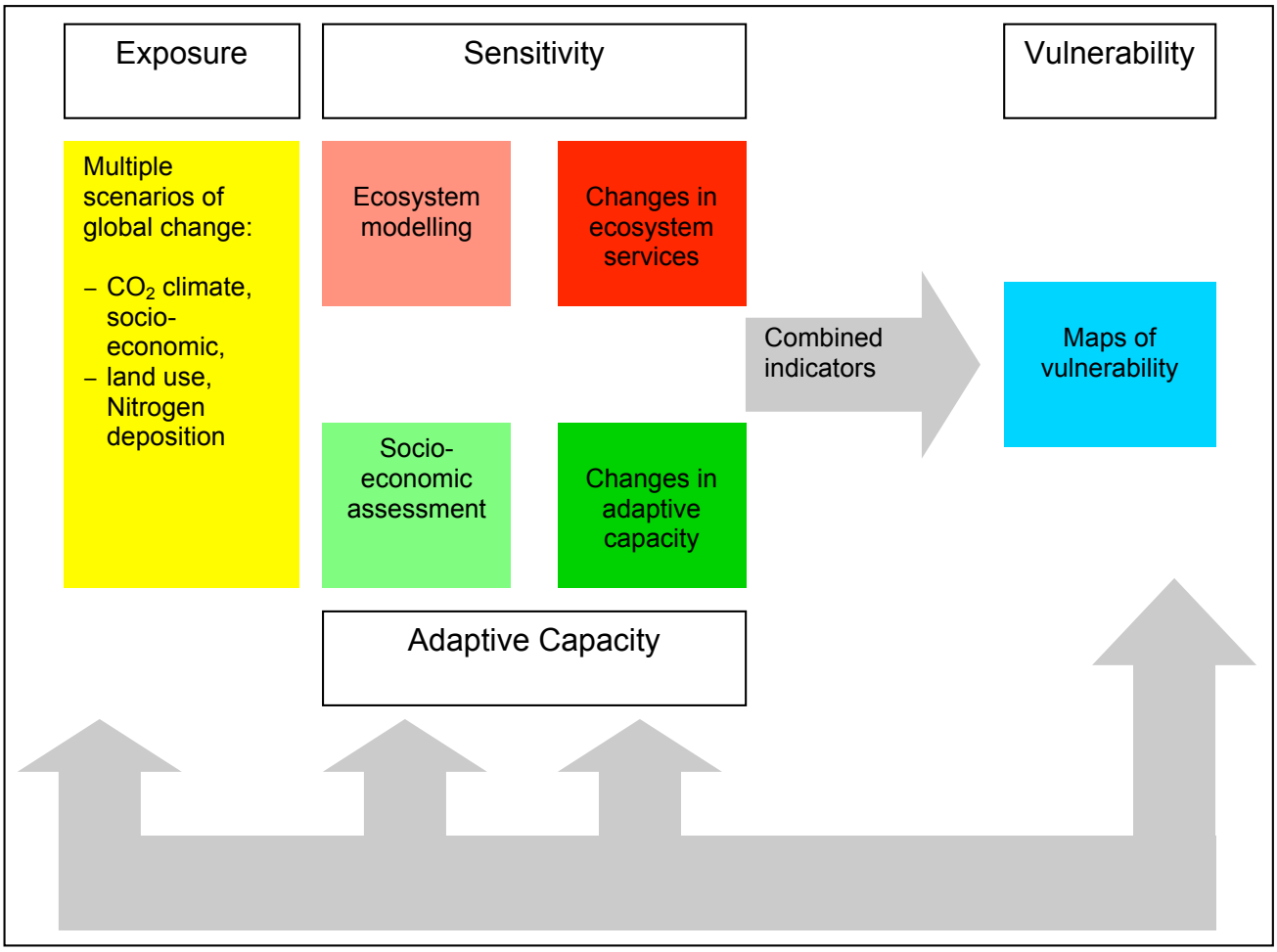

Figure 1. The structure of the ATEAM project with the specific interactions between scientists and stakeholders (from Schröter et al., 2004).

The project methodology is presented in Figure 1[3]. It used a typical deductive, quantitative, natural science approach. Firstly, its umbrella concept, vulnerability, was described and broken down into constitutive elements (i.e. Exposure, Sensitivity, Adaptive Capacity) following established conceptual frameworks. Secondly, driving forces were identified (i.e. climate and land use changes), scenarios were built and proxy indicators were derived and quantified through ecological modelling. Thirdly, a generic, semi-quantitative index for adaptive capacity was derived

[2] Conditions and processes through which ecosystems and the organisations that make them up sustain and fulfil human life.
[3] For the precise description of the methodology and the terminology used, consult Schröter et al. (2004, 2005).

from established socio-economic indicators. Finally, all these indicators were combined to produce an aggregated index of vulnerability expressed on a geographically explicit grid of Europe of 16 km x 16 km.

The stakeholder dialogue aimed at adjusting the project's results to better suit stakeholders' needs with the following goals: identifying and evaluating indicators of change in ecosystem services; determining useful modelling scales (spatial and temporal) and units for these indicators; discussing adequate thresholds for these indicators, beyond which sectoral adaptive capacity could be exceeded; developing stakeholders' ability to use information derived from scenario analysis; and discussing and disseminating the project's results.

Potential stakeholders were identified using the snowball approach (Biernacki and Waldorf, 1981). To complement this a systematic selection matrix was designed based on three main categories: 1) the human activity sectors considered in the overall assessment (e.g. 'Agriculture,'); 2) the type and main interests of stakeholder organisations (e.g. private firm, public management, non-governmental organisations); and 3) the scale of activity of these organisations (i.e. from local to international). The resulting stakeholder database included 204 identified stakeholders, 152 of which were invited to our activities with 58[4] participating in at least one activity.

Sectoral representatives, consultants and private businesses were particularly targeted for the 'Agriculture', 'Forestry', 'Water' and 'Tourism' sectors, since decision-makers and managers in these sectors are often private agents. In contrast, stakeholders from public or independent sectors were approached for the 'Biodiversity and nature conservation', 'Carbon storage' and 'Mountain environments' sectors, since the associated ecosystem services are often non-marketed (Reid et al., 2005), and policy-making occurs at national and/or European levels (e.g. climate mitigation, ecological directives). Policy-makers *per se* were deliberately not included in the stakeholder matrix, since the project targeted stakeholders who though influential could nevertheless express their views freely. In the end, most targeted organisations had a European to global focus of activity, the scales at which the ATEAM results are the most relevant.

The stakeholder selection criteria included: (inter-)sectoral expertise, some knowledge on climate and environmental issues, general interest for scientific issues and an open, curious and critical mind. Stakeholders' known or presumed views on global change did not however constitute a selection criterion to encourage multiple perspectives. Rather than a public participation exercise, we pursued a focus group approach with selected participants. Therefore a

[4] These numbers strictly refer to the stakeholders identified, approached or participating within the ATEAM dialogue activities reported upon here. Many more stakeholders were less directly involved within ATEAM via: 1) additional dissemination and outreach activities carried out within the project, and 2) parallel stakeholder networks and activities developed within other projects or institutes, within which ATEAMers participated (for a complete report on these see Schröter et al. (2004).

representative sample of society was not aimed at. Although repetitive attempts were made to engage as many different stakeholders as possible, including private companies and specific consumer/interest groups, most chose not to participate.

Our selection criteria, combined with stakeholders' decision criteria to participate or not, produced a 'green' and 'scientific' bias in the participating group. Stakeholders needed to be convinced that they would gain significant benefits before they committed any amount of time and effort into extra-professional activities. Communication skills and a feel for how to engage stakeholders and demonstrate the relevance of the research project for their activities certainly helped to gain stakeholder support. However, in some cases the research topic was simply too disconnected from stakeholders interests to secure their participation.

Throughout the ATEAM project three general and three smaller scale sectoral stakeholder workshops were organised. ATEAM scientists participated in 11 further stakeholder events organised within collaborating initiatives (see Schröter et al., 2004). Furthermore, multiple informal exchanges between scientists and stakeholders took place. The primary goal of the formal stakeholder workshops was to facilitate the exchange of information and discussion between scientists, which were involved in modelling development, and stakeholders, who could provide expert knowledge on on-going strategies and practice in natural resource policy and management. Typically, formal workshops gathered an equal number of scientists and stakeholders, with the total number of participants not exceeding 40. Formal events lasted from an afternoon to two days and were organised in a series of plenary and sector-specific working groups. Additional stakeholder events were a series of information side-events, where the ATEAM project, its methodology and results were presented, although here the emphasis was mostly on the unilateral transfer of information from project representatives to potential users, rather than on exchange between scientists and stakeholders.

3. Evaluation of the ATEAM stakeholder dialogue

3.1. Methodology

At main events, stakeholders were asked to complete a questionnaire on the project and workshop content and format. Informal feedback was collected during the events. External observers moreover evaluated the workshops and provided recommendations for future events (Jürgens, 2001; Vreugdenhil, 2003). Finally, semi-structured interviews were carried out with the project leader and coordinator, and one scientist per modelling sector to explore views on the impacts of the stakeholder dialogue on their research. The sections below summarise the main points made by participants, observers and scientists.

3.2. Stakeholders' influence on ATEAM research process and content

If the project's aim to define and produce stakeholder-relevant results was, as such, a powerful coordination tool, which continuously steered the consortium's work, stakeholders themselves had a significant impact on the ATEAM research. This included: 1) thought-provoking perspectives and opinions on the research framework, the near final results and their meaningfulness for stakeholders' activities; 2) suggestions on ways to further improve result communication/dissemination; and 3) contributions to future research agenda.

Practically, stakeholders reviewed and evaluated the methodology and some assumptions used in developing the land use scenarios and specific ecosystem models, as well as the temporal and spatial scales of the results. Stakeholders helped scientists to select and prioritise the indicators of ecosystem services for the assessment framework and to gain insights on how ecosystem services were recognised and managed. They provided invaluable information on the multiple facets and challenges of sectoral management practice and adaptation. They also enthusiastically supported additional exploratory case studies, particularly that on biomass energy potential (Tuck et al., 2006) and agricultural adaptive capacity (Reidsma et al., 2008).

Figure 2. Menu of the ATEAM Atlas of European Vulnerability.

Finally, to ease the presentation, dissemination and analysis of the project results a digital

compilation of the project's most salient results, the ATEAM Atlas of European Vulnerability[5], was developed (Metzger et al., 2004; Metzger and Schröter, 2006) (see Figure 2). This tool allows users to select indicators of impact and vulnerability, using the socio-economic, climate and land use scenarios they are most interested in. The maps are placed in a fact sheet, which provides succinct information on the models, scenarios and indicators used, the main underlying assumptions and additional references. Aggregated resulted can be decomposed and both relative and absolute data can be viewed. Furthermore, simple queries can be performed and users can zoom on specific environmental regions or countries. Early versions of the tool were improved with the help of stakeholders' comments. The final version of the ATEAM Atlas of European Vulnerability is freely available under: http://www.pik-potsdam.de/ateam/ateam.html

3.3. Stakeholders' evaluation

Content evaluation

Stakeholders generally found ATEAM's conceptual framework, the vulnerability assessment methodology, and the Atlas of European Vulnerability interesting and innovative. The temporal and spatial scales of ATEAM analyses were, however, of unequal relevance. The 1990, 2020, 2050, 2080 time slices were useful, for example, for stakeholders in the 'Forestry', 'Carbon storage' and 'Biodiversity and nature conservation' sectors, and to a lesser extent in 'Mountains environments', for which long-term management is key. However, for the 'Water' and 'Agriculture' sectors short-term estimates for the next five to ten years would have been more useful. For many stakeholders the spatial scale of the assessment remained too coarse, despite its exceptionally fine resolution in comparison to other global change assessments.

The identification and assessment of specific ecosystem services, which could be significantly impacted in future, were most relevant for the majority of stakeholders, since this information forms an appropriate basis for exploring adequate adaptation strategies at European to regional levels. In comparison, the aggregated index for 'adaptive capacity' and 'vulnerability' *per se* were judged of limited value (Schröter et al., 2005). Such concepts and indicators therefore seem to have more pertinence as an element for broad scale academic analysis than for practical environmental management (Patt et al., 2005). Stakeholders are generally acutely aware of existing needs and opportunities to adapt to change in their management practice and sectoral adaptation is closely intertwined with economically viability. Stakeholders critically review current policies, market fluctuations and environmental changes, which may benefit or endanger their activity. They are thus continuously re-appraising the vulnerability and adaptive capacity of their activity to changing conditions (albeit without using this terminology). ATEAM's macro-scale, generic index of adaptive capacity does not provide the specific information stakeholders wish

[5] The ATEAM Atlas of European Vulnerability is available to download at: http://www.pik-potsdam.de/ateam/

and is thus of limited interest to them. Scientists and stakeholders however agreed that the components of sectoral adaptive capacity, the interactions between macro and (inter-)sectoral adaptive capacities, and between these and vulnerability were key areas for future research.

Also within the land use scenarios, stakeholders isolated specific driving forces, which they believe should be better taken into account in scenario and model assumptions, in particular policy, market trends, sectoral management, consumer preferences and extreme events. Within the modelling of terrestrial carbon storage, stakeholders inspired a major research re-orientation by prioritising the implementation of more realistic forest management and land use changes over the improved representation of the nitrogen cycle in dynamic vegetation models, which was originally planned. Stakeholders further agreed that in disseminating research results, it should be clearly pointed out that scenarios represent alternative choices of society, rather than possible futures that unfold independently from societal and individual decisions.

Stakeholders' confidence in ATEAM's results was enhanced as significant agreement across modelling results and scenarios was demonstrated. For example, tree productivity increases in most scenarios in North European but is limited by water availability in Mediterranean areas. Also all scenarios and results from all sectors agree on particular regional vulnerabilities, for example that of the Mediterranean and Mountains regions (Schröter et al., 2005). Consequently, stakeholders particularly encouraged comparative assessments of impacts of alternative policies across different economic sectors, which might allow decision-makers to better choose between different future pathways.

Nevertheless, there was a broad consensus that ATEAM results, or any state-of-the-art vulnerability assessment, would not directly influence decision-making and management behaviour due to the still too large temporal and spatial scales and associated significant cumulative uncertainty. Stakeholders, who await predictions or detailed quantified outputs to guide their decision-making, will be disappointed by the lack of 'answers' from integrated modelling. Integrated assessment results should therefore not be viewed as potential provider of predictions ('truth machines', see Shackley and Darier, 1998), but as compilation of best current knowledge, and as food for thought and debate within a wider social discourse on global change. However, specific modelling tools produced to facilitate decision-making (e.g. decision support systems) may play an important role when targeted at a group of stakeholders. Efforts in this direction included the development of a tool for natural reserve selection that takes into account economic and ecological considerations (Araújo et al., 2002) and a comparison of the effectiveness of different reserve selection tools under climate change (Araújo et al., 2004).

Finally, stakeholders attached great importance to information on the economic cost and benefits of a specific policy (e.g. does it make economic sense to switch to biomass energy

crops?). Thus, linking ATEAM's vast information pool to economic valuation could be one way to increase the meaningfulness of the project's results for stakeholders in the future, although it might be necessary to overcome a strong resistance from nature scientists to attach monetary values to ecosystem service provision. Environmental and economic model coupling is a development that goes in this direction (Jaeger et al., 2002).

Process evaluation

An evaluation questionnaire was distributed to stakeholders at three events[6]. In total 22 stakeholders out of 58 handed back questionnaires. All numbers quoted below within brackets refer to respondents answering 'Yes' or 'Mostly' to questions out of a total of 22 respondents[7].

Most respondents believed that the ATEAM workshops had been generally relevant to their work (19) and worth their time out of work (18). Most appreciated the content and the range of topics covered and found presentations interesting (21). Most gained some useful insights on the topics covered (21), and thought they would be able to integrate some of these in their work (19). For some, too many topics were covered (2), which prevented in-depth discussions on the specific subjects they were interested in (e.g. local scale impacts on biodiversity, downstream activities in 'Agriculture' or 'Forestry' sectors, sectoral adaptive capacity).

Most stakeholders felt comfortable enough to express their opinions (21) and believed that these had been adequately valued by participants (19). Some emphasised the need for unbiased moderation. In later events, stakeholders were offered the possibility to alternate with ATEAMers as moderators. It seems that active participation, constructive criticism and an atmosphere conducive to developing trust and friendliness were achieved. Stakeholders also valued the opportunity to network with peers and scientists as a way to encourage synergies and collaboration. Fellow participants were relevant to many, who envisaged keeping in contact with some of them independently from ATEAM events (12).

Most respondents had been sufficiently interested in ATEAM to envisage participating in follow-up activities (17). Eventually, 11 out of 58 participated in at least two dialogue activities. All respondents wished to receive further information on the project and its final results, and many had already talked about ATEAM to colleagues (18). It seems that for respondents, ATEAM had successfully engaged participants, raised interest in its research and provided a dynamic and stimulating discussion and dissemination platform.

The main criticisms on the dialogue process were the infrequence of the events, the long time between events and the lack of regular and transparent feedback in between activities. Some stakeholders expressed some frustration if they felt that their comments had not been adequately

[6] The 2nd and 3rd general stakeholder workshop and the Mountain and Biodiversity sectoral stakeholder workshop.
[7] For the full results of the evaluation questionnaires see: de la Vega-Leinert, A.C. et al. (2004) available from the author.

taken on board. These critiques relate to a key issue in participative research. By asking stakeholders' opinion, ATEAM also raised the expectations that these opinions could and would be fully taken into account. However, the tight research plan and set list of deliverables the project had committed itself to produce meant that the margin of manoeuvre scientists had in addressing stakeholders' comments was significantly narrower than stakeholders thought. Clarifying as early as possible and as repeatedly as necessary how far stakeholders may influence the research programme is thus critical. Important stakeholders' concerns did nevertheless find their way into ATEAM research (e.g. the above mentioned study on agricultural adaptive capacity). Other concerns may only be addressed adequately through fundamental model developments over the long term (e.g. bridging gaps between global modelling scales and local management needs).

Stakeholders encouraged the scientific community to continue raising relevant societal questions, regarding global change impacts and adaptation. They generally believed that ATEAM succeeded in formulating strong messages on European vulnerability to global change, which provided some guidance in policy and decision-making for a range of stakeholder groups (including landowners' and farmers' organisations, forestry and biodiversity managers, and environmental non-governmental organizations), and contribute to increasing societal awareness.

Both stakeholders and scientists agreed that the way results are framed, interpreted and communicated plays a major role in how modelling outputs are used. Nevertheless, views on the best approaches to foster an informed use of scientific results differed. For scientists the ATEAM Atlas should address issues of data clarity and comprehensiveness. Although stakeholders praised this initiative, some would have preferred meaningful user-targeted syntheses and policy recommendations, based on key mapped outputs. In trying to meet this request a delicate balance has to be found between honesty about the uncertainty of the results and clarity of the message conveyed.

3.4. Scientists' perception and evaluation of the dialogue

Initially scientists' attitudes regarding the stakeholder dialogue and its meaningfulness in serving the research plan were mixed. Enthusiasm and interest about developing significant elements of applied and participative research met scepticism on whether this activity would add substantially to the research in view of the costs involved (i.e. time, effort, resources, which could have been spent on the modelling itself). There was also anxiety about the potential failure to provide the information stakeholders sought.

The project incorporated elements of qualitative, exploratory, participative social sciences in a framework otherwise centred on fundamental quantitative ecological modelling. There was some uncertainty on how to perform this well. In the peer community some viewed this initiative 'at best'

as a marketing trick to attract funding or 'at worst' as a 'non scientific' goal, which would discredit the overall project's scientific credibility. This represented a significant risk and it required much effort to convince some project members and peers that the dialogue with stakeholders was a valid choice from the scientific point of view. The latter was achieved by not compromising in core parts of the research plan (e.g. the detailed modelling developments and the benchmarking exercise – see Morales et al., 2005), which were not presented to stakeholders. These formed the main scientific achievements *per se* of the project and guaranteed scientific credibility in the ecological modelling peer community. As consensus was forged on the originality and feasibility of the overall methodology, including the generic adaptive capacity index, and of importance of the stakeholder dialogue component, the project achieved scientific recognition in the interdisciplinary global change assessment community.

All interviewed scientists clearly took the need for consultation and transfer of scientific information to stakeholders seriously. They expected to obtain valuable feedback from stakeholders on specific issues (e.g. on thresholds of change in ecosystem service provision beyond which sectoral adaptive capacity would be endangered). This was not always the case, and some scientists felt somewhat frustrated at having invested substantial efforts into the dialogue for apparently little return. Like stakeholders, most scientists believed that the dialogue had been too fragmented. In terms of timing moreover, the first workshops were simply too early for some scientists, who felt they had not had become sufficiently familiar with new models, or had not developed them to their satisfaction. These critiques relate to the way the dialogue was designed and implemented: i.e. few, far-apart, content-rich workshops. This format reduced the time available to explore some pertinent questions scientists and stakeholders had. Scientists and stakeholders alike would have welcomed more frequent, focused meetings, and to move away from the general 'presentation-feedback' mode, to a 'working group' approach. Some scientists thus pursued in-depth interactions with stakeholders outside the 'official' dialogue activities.

Scientists generally felt comfortable during the dialogue interactions, since all stakeholders were science-literate and sympathetic to, or even experienced in ecological and/or global change modelling. Scientists found it easier to communicate with stakeholders who had a clear agenda (e.g. managers, scientific advisers, NGOs) than with some who systematically focused on, or lobbied for, their own interests (e.g. a few private managers and consultants). A common language first needed to be established, which occasionally required long discussions to adjust the terminology to better suit stakeholders' opinions. For example, the term 'unprotected land' was renamed 'undesignated land' in the land use scenarios, after stakeholders insisted that all land management included some degree of protection. Even if terminology discussions take time and may appear tedious or frustrating, they are in fact necessary negotiation processes, which helps to develop a broad consensus.

Scientists generally experienced stakeholders as understanding, curious and interested and some thus wondered if the lack of a 'cultural shock' did not imply that the project had failed to find 'real' stakeholders. However, when some stakeholders insisted on their own agenda, even if this played a minor role in the wider scope of the project, some scientists experienced them as 'pushy' or 'narrow-minded'. This illustrates just how complicated the selection of the appropriate stakeholders for a given project can be. Within ATEAM, stakeholders needed to be able to understand the basic science, while being able to detach themselves sufficiently from their particular interests in order to contribute to a collective discussion.

Some scientists emphasised the challenges involved in communicating the usefulness of abstract, long-term exploratory research (e.g. global change scenarios). Stakeholders appeared to be primarily interested in obtaining 'relatively certain' information on near-future sectoral impacts of global change at local scale. These seemingly irreconcilable expectations may have been prompted by the format chosen. Stakeholders were confronted with scenarios already largely developed, the assumptions and related value judgment of which they were asked to comment upon. Initially stakeholders reacted by pointing out driving forces, which were critical for them, sometimes only to hear that these were or could not be included at this stage (e.g. on the role of the agro-industry). Explicitly, this activity opened the black box of scenario making to allow stakeholders to evaluate it. Implicitly, however, stakeholders were asked to accept and trust that the scenarios produced were as best as could be within existing constrains. These ambivalent aims could explain the apparent mismatch in interests and expectations. Effectively most stakeholders deal with uncertainty in their decision-making and develop their own mental models and scenarios to perform their work (although they may not use this terminology). It is precisely these abilities that are funnelled into stakeholder-led scenario-making processes, within which stakeholders are given free reign to identify key driving forces and to elaborate narratives, which are then formalised and quantified by scientists (Shackley and Deanwood, 2003). Unfortunately, the timing and workplan of the project did not allow using this method within ATEAM, since this should have taken place well before the scenarios were actually constructed to give time to scientists to actually devise methods to incorporate stakeholders' ideas.

Two external observers noted that stakeholders had little possibility to set the agenda of the meetings, to take an active part in the overall decisions on the research programme and outputs, or to be adequately informed on how their comments were incorporated within the research (Jürgens, 2001; Vreugdenhil, 2003). These are valid critiques. Indeed more flexibility could have been built in to allow decisions and discussions to be steered more substantially by stakeholders. Key stakeholders could theoretically have been brought in as early as the project proposal development stage. However, since the research plan was already largely set and agreed with the funding agencies, before the first stakeholders were contacted, the methodology for modelling and scenario design and its implementation was only marginally influenced by interactions with

stakeholders. Nevertheless, the Work Package on Synthesis was left relatively open at the beginning of the project. Here there was sufficient flexibility and resources to explore methods and tools in a learning-by-doing approach to best compile and communicate the results of the project and to adjust substantially to stakeholders' comments. It is within this part of the project that the ATEAM Atlas was developed (Metzger et al., 2004; Metzger and Schröter, 2006). The digital atlas was, however, also a solution proposed and developed by scientists with little contribution of stakeholders, apart from the feedback they provided during the final general workshop.

4. Discussion

4.1. A paradox in global change assessment research?

Global change models are increasingly being coupled to combine the insights of both biophysical and socio-economic disciplines (Muetzelfeldt, 2003). More comprehensive results are thus produced, which help uncovering clear trends and/or a range of possible outcomes, while computer tools allow representing them in ever-finer resolutions (McCarthy et al., 2001). These results are however based on broad or generic assumptions, and even the finest models produce considerable uncertainty (Reilly et al., 2001). At the same time global change models, such as those used in ATEAM, produce large amounts of interesting results, and browsing through them requires much dedication. For example, the ATEAM vulnerability atlas is a compilation of over 3000 maps and many more summarising charts (Metzger et al., 2004; Metzger and Schröter, 2006). Despite the considerable achievement of producing these scientific results, there seems to be a paradox in presenting vast amounts of uncertain results in a format that suggests a high level of accuracy.

It would be interesting to investigate what viewers instinctively take in when observing the maps in Figure 3. How would they combine the message from the text, which points at significant areas of modelling uncertainty, with the detail of the colour contours? Regardless of how much and how precise information one gets on the uncertainty levels involved in the computation of this modelling output, this sort of figures may become a cognitive trap, in that, it is argued, they give contradicting messages on the reliability of these model outputs. If the text invites the viewer to cautious analysis, the level of detail displayed in the figure invites the viewer to associate "precision" for "accuracy" and possibly to take the result for granted. Moreover, a non-informed user will intuitively focus on the region/sector he/she is more interested in and overlook the broad simplifications and uncertainties attached to them. The potential for misunderstanding and misinterpretation of the results is thus large. ATEAM dealt with this serious issue by embedding all maps in succinct fact sheets. However, although clear flags can be built in to draw attentions to limits of modelling, these demand the users to commit the time and effort to understand them.

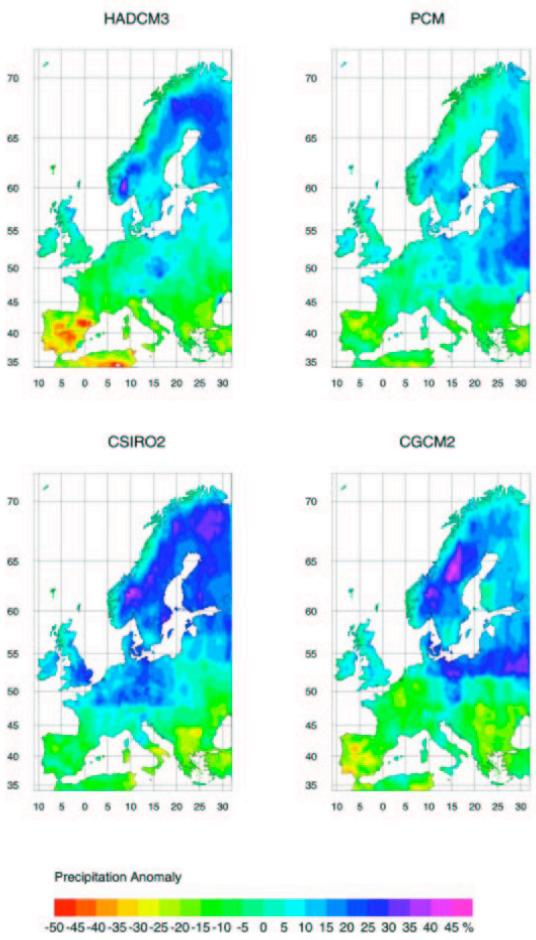

Figure 3. Annual precipitation anomaly for the A2-scenario (2091-2100) compared to 1961. The relative spatial pattern projected by each climate model remains the same over different emission scenarios, and only the size of the anomaly varied between the emission scenarios for one and the same Global Climate Model. Therefore these maps demonstrate the complete relative spatial variability of the climate projection on the annual timescale, even though only one emission scenario (A2) is shown (taken from Schröter et al., 2005)

One way to tackle this paradox is to research methods to better assess and manage uncertainty in global change models (e.g. Rotmans and van Asselt, 2001). Another way, preferred by stakeholders, is to produce targeted lay syntheses, with specific modelling outputs. This could be understood as the responsibility of scientists, since they would effectively take control of the whole scientific knowledge production, integration and communication process. However, few

scientists are keen to perform all these tasks, while those who do are often considered as 'interpreters' or 'communicators' of science rather than scientists *per se*. In ATEAM a middle way was explored: to take the initiative and the risk to dedicate substantial resources to collaborate with stakeholders and to open with them the black box of modelling. If stakeholders did not obtain the precise results they were after, the dialogue gave them the opportunity to debate not only the possible implications of global change, but also to better understand global change modelling itself, including the attached uncertainty. This is a first step in developing participating interfaces in ecological modelling, which promote collaborative inquiry as proposed by van den Hove (2006).

4.2. Transparency as a basis for open negotiation

Participatory research is about creating the opportunity for confrontation and discussion of different worldviews and perceptions. By opening a window for interactions, scientists are inviting stakeholders to have a say on the research process and content, and are thus opening themselves to critique as well as praise. This feedback is extremely valuable but can be difficult to accept if it does not correspond to the expectations scientists have. Different participants have different expectations about what the dialogue and research should be about. The scope, boundaries and desired outcomes of the research and the dialogue exercise should ideally be collectively discussed and agreed upon, or at least clearly stated so that stakeholders understand what is expected from them, and what they can expect from participating in the process. Indeed, participants, whether scientists or stakeholders, have an implicit and explicit agenda when engaging in a dialogue process. Explicitly, scientists may for example want to evaluate their research with stakeholders, implicitly however they may also seek their endorsement to push their method and results forward. Explicitly stakeholders may want to obtain more information and implicitly to steer scientific research in specific directions suited to their particular needs. There is nothing wrong about these objectives as such, if these are made transparent, so that participants are aware of the diverse motivations at hand, and so that conflicting interests may be addressed openly. To reconcile these widely different expectations and views within a participative research process, science-stakeholder dialogue can be a valuable method and an innovative negotiation, or even mediation platform. For the latter, however a sympathetic, fair, open and rigorous third party is required, that both parties may accept and trust in this demanding but profoundly rewarding process of collective learning.

The scientists involved in ATEAM feel a strong responsibility in supporting a transition to sustainability by producing meaningful information for European policy and decision-makers. To improve the societal relevance of ATEAM's results was thus an explicit aim of the project. At the same time, scientists wanted to improve the state-of-the-art of ecological modelling *per se.* Another explicit goal was thus to achieve scientific credibility and recognition among the scientific

peer community. These two explicit aims were not incompatible but raised different, sometimes conflicting priorities: e.g., on how to adapt the planned research programme to best tackle stakeholders' needs. Moreover, scientists face substantial restrictions in terms of data availability and quality. Even if resources were unlimited, many interesting scientific approaches and stakeholders' suggestions could not have been addressed for simple want of appropriate data. The many, sometimes mutually exclusive, research avenues possible needed to be prioritised. In this process, stakeholders provided valuable input to better balance scientific and socially relevant research questions.

4.3. Reconciling scientists' and stakeholders' expectations

If global change research is to overcome the discrepancies between stakeholders' expectations from science and current capability to fulfil these, further and stronger bridges are needed to reinforce dialogue and collaboration between science, policy and society. To raise the visibility and meaningfulness of vulnerability assessments as critical means to better understand global change and its potential worrying impacts on society, two trends are being followed, the common denominators of which are science-based stakeholder dialogues. On the one hand, uncertainty has emerged in the last decade as a major issue in global change modelling and in the vaster context of the 'post-normal science' paradigm (Funtowicz and Ravetz, 1993). Key issues identified here are how to better communicate scientific uncertainty to policy-makers and society, and more generally how to facilitate decision-making in face of uncertainty. These lines of reflection have fostered the development of a rich discourse bringing together representatives of science, policy and society to contribute to a better understanding of modelling opportunities and limits (e.g. Dessai and Hulme, 2004). The ATEAM dialogue process can be understood as a further step in this direction. On the other hand, some assessments seek to explicitly target specific policy- and management-orientated questions at higher spatial resolution, in close consultation with interested stakeholders. The aimed products here are smaller, dedicated models, clear and targeted result syntheses, and self-explanatory information tools, which consider national and subnational scales. Both avenues can feed each other, for mutual benefits, in particular in bridging the gap in temporal and spatial scales relevant for scientists and stakeholders, and to create a more dynamic scientific agenda, better suited to the rapidly changing policy agenda. The ATEAM analysis has also a role to play in this second area of research. It has for example already served as a broad basis for downscaled assessments (Zebisch et al., 2005). The vulnerability atlas and the tool for natural reserve selection developed within ATEAM are moreover valuable initiatives towards a better communication of global assessment results (Araújo et al., 2002, 2004; Metzger et al., 2004; Metzger and Schröter, 2006).

5. Conclusions

The potential of numerical modelling as a guide for policy-making primarily relies on its scientific credibility at disciplinary and interdisciplinary levels, but also on the degree of societal relevance and acceptance that models achieve among policy and decision-makers. We argue that both are to a certain extent a negotiated social process rather than purely a scientific exercise. This is the fundamental challenge integrated assessments face, namely to achieve an acceptable level of simplification and associated uncertainty while at the same time still encompassing the key complexity of the simulated systems.

In tackling this challenge, vulnerability assessment research is being pulled by two opposing forces related to different interpretations of the role of scientific inquiry. Van den Hove (2007: 818) thus distinguished issue-driven 'science for action' from curiosity-driven 'science for science'. The former fosters a user-orientated discipline focused on satisfying stakeholders' short-term information needs (where scientists may become commissioned consultants or advisers). The latter prefers a discipline where the definition of research problems, priorities and methodologies remain primarily in the hands of scientists and where stakeholders play a peripheral role. A middle ground between these visions thus needs to be found in vulnerability assessments research, so that societal relevance does not take precedence over scientific excellence and credibility, or vice versa. This compromise will have to be negotiated on a case-by-case basis from the design to the implementation stages. To this end, innovative approaches to move away from the perception of science as top-down production of expert answers to one of science as collective exploration of the plausible are required. Here scientific inquiry is conceived as a process of co-creation of knowledge where scientists and stakeholders collaborate as partners, each bringing to the partnership valuable questions, conceptualisations, contents and methods (Welp et al., 2006a). Furthermore, dialogue processes dedicated to debating uncertainty as perceived by scientists and lay people could help solving significant misunderstandings about the potential and limits of modelling. This would provide valuable opportunities to reflect on constructive manners to communicate uncertainty, and to incorporate it in decision-making.

The ATEAM stakeholder dialogue has been an important result. The project collaborated with an expanding stakeholder network and its assessment approach was improved through stakeholders' critique. The original research plan and the ecosystem modelling *per se* were not fundamentally changed by stakeholders. However, stakeholders provided healthy and constructive 'outsider' views. Through this experience scientists considerably adjusted their thinking and work. They gained valuable insights on stakeholders' perceptions on ecosystem services and global change and on ecosystem management and sectoral adaptive capacity. Together scientists and stakeholders contributed to developing bridges between the generators of scientific knowledge and their users.

We believe that stakeholders need to understand the roles and limits of scientific enquiry and modelling performances. It is vital to understand that scientists cannot provide *predictions* of future global change impacts and vulnerability, instead they make *projections* and explore *multiple scenarios*. Stakeholders should not expect that such a task is feasible, as large uncertainty is unavoidable since society is continuously shaping its future in a complex unpredictable manner. Similarly, scientists should be cautious when committing themselves to producing stakeholder-targeted products and more broadly results that are socially relevant over the short term. To achieve these, scientists need to yield a substantial part of their decision power over to the targeted stakeholders, or at least to negotiate openly with them the main lines of the proposed research. At the same time scientists may need to accept the challenge of better communicating their research in formats preferred by stakeholders, or to dedicate more time still to 'educate' stakeholders to understand and use scientific results, while stakeholders 'educate' scientists to produce more relevant and helpful information.

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References

Araújo, M.B., Williams, P.H. and Turner, A. (2002) 'A Sequential Approach to Minimize Threats within Selected Conservation Areas', *Biodiversity and Conservation* 11: 1011-24.

Araújo, M.B., Cabeza, M., Thuiller, W., Hannah, L., Williams, P.H. (2004) 'Would Climate Change Drive Species out of Reserves? An Assessment of Existing Reserve-selection Methods', *Global Change Biology* 10: 1618-26.

Biernacki, P. and Waldorf, D. (1981) 'Snowball Sampling. Problems and Techniques of Chain Referral Sampling', *Sociological Methods and Research* 10 (2): 141-63.

de la Vega-Leinert, A.C., Schröter, D., Fritsch, U. and Zierl, B. (2004) Results of the Stakeholder Evaluation Questionnaires. ATEAM report. Potsdam Institute for Climate Impact Research (PIK), Germany. Available from the author.

Dessai, S. and Hulme, M. (2004) 'Does Climate Adaptation Policy Need Probabilities?' *Climate Policy* 4: 107-28.

Funtowicz, S.O. and Ravetz, J.R. (1993) 'Science for a Post-normal Age', *Futures* 25: 739-55.

McCarthy, J.J., Canziani, O.F., Leary, N.A., Dokken, D.J. and White, K.S. (eds) (2001) *Climate Change 2001: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change* (IPCC). Cambridge: Cambridge University Press.

Metzger, M. J., Leemans, R., Schröter, D., Cramer, W. and the ATEAM consortium (2004) *The ATEAM Vulnerability Mapping Tool*. Wageningen: Office C.T. de Wit Graduate School for Production Ecology and Resource Conservation (PE&RC). CD-ROM publication No. 27. Available at www.pik-potsdam.de/ateam.

Metzger M.J. and Schröter D. (2006) 'Towards a Spatially Explicit and Quantitative Vulnerability Assessment of Environmental Change in Europe', *Regional Environmental Change* 6(4): 201-216.

Metzger, M. J., Schröter, D., Leemans, R. and Cramer. W. (2008) 'A Spatially Explicit and quantitative vulnerability assessment of environmental change in Europe', *Regional Environmental Change* 8(3): 91-107.

Morales, P., Sykes, M.T., Prentice, C., Smith, P., Smith, B., Bugmann, H., Zierl, B., Friedlingstein, P., Viovy, N., Sabaté, S., Sánchez, A., Pla, E., Gracia, C.A., Sitch, S., Arneth, A. and Ogee, J. (2005) 'Comparing and Evaluating Process-based Ecosystem Model Predictions of Carbon and Water Fluxes in Major European Forest Biomes', *Global Change Biology* 11 (12): 2211.

Muetzelfeldt, R. (2003) Declarative Modelling in Ecological and Environmental Research. AVEC Papers. URL (consulted January 2008): http://www.pik-potsdam.de/avec/decmod_final8.pdf

Patt, T., Klein, R.J.T. and de la Vega-Leinert, A.C. (2005) 'Taking the Uncertainty in Climate Change Vulnerability Assessment Seriously', C.*R. Geoscience* 337: 411-24.

Reid, W. V., Mooney, H. A., Cropper, A., Capistrano, D., Carpenter, S.R., Chopra, K., Dasgupta, P., Dietz, T., Duraiappah, A. K., Hassan, R., Kasperson, R., Leemans, R., May, R.M., McMichael, T. A. J., Pingali, P., Samper, C., Scholes, R., Watson, R. T., Zakri, A. H., Shidong, Z., Ash, N. J., Bennett, E., Kumar, P., Lee, M. J., Raudsepp-Hearne C., Simons, H., Thonell, J. and Zurek, M. B. (2005) *Ecosystems and Human Well-being. Millennium Ecosystem Assessment Synthesis Report*. Washington DC: Island Press.

Reidsma, P., Ewert, F., Oude Lansink, A. and Leemans, R. (2008) 'Vulnerability and Adaption of European Farmers: A Multi-level Analysis of Yeld and Income Responses to Climate Variability'. *Regional Environmental Change*. In Press: http://dx.doi.org/10.1007/s10113-008-0059-3

Reilly, J., Stone, P.H., Forest, C., Webster, M.D., Jacoby, H.D. and Prinn, R. (2001) 'Climate Change: Uncertainty and Climate Change Assessments', *Science* 293 (5529): 430-3.

Rotmans, J. and van Asselt, M.B.A. (2001) 'Uncertainty Management in Integrated Assessment Modelling: Towards a Pluralistic Approach', *Environmental Monitoring and Assessment* 69 (2): 101-130.

Schröter, D. and the ATEAM Consortium (2004) *Final ATEAM Report 2004*. Section 5 and 6. Potsdam: Potsdam Institute for Climate Impact Research. URL (consulted January 2008): http://www.pik-potsdam.de/ateam/ateam_final_report_sections_5_to_6.pdf

Schröter, D., Cramer, W., Leemans, R., Prentice, C.I., Araújo, Arnell, N.W., Bondeau, A., Bugmann, H., Carter, T.R., Gracia, C.A., de la Vega-Leinert, A.C., Erhard, M., Ewert, F., Glendinning, M., House, J.I., Kankaanpää, S., Klein, R.J.T., Lavorel, S., Lindner, M., Metzger, M.J., Meyer, M., Mitchell, T., Reginster, I., Rounsevell, M., Sabaté, S., Sitch, S., Smith, B., Smith, J., Smith, P., Sykes, M.T., Thonicke, K., Thuiller, W., Tuck, G., Zaehle, S. and Zierl, B. (2005) 'Ecosystem Service Supply and Vulnerability to Global Change in Europe', *Science* 310: 1333-37.

Shackley, S. and Darier, E. (1998) 'Seduction of the Sirens: Global Climate Change and Modelling', *Science and Public Policy* 25 (5): 313-26.

Shackley, S. and Deanwood, R. (2003) 'Constructing Social Futures for Climate Change Impacts and Response Studies: Building Qualitative and Quantitative Scenarios with the Participation of Stakeholders', *Climate Research* 24 (1): 71-90.

Tuck, G., M.J. Glendining, P. Smith, J.I. House, M. Wattenbach (2006) 'The Potential Distribution of Bioenergy Crops in Europe under Present and Future Climate', *Biomass & Bioenergy* 30 (3): 183-97.

Van den Hove, S. (2007) 'A Rationale for Science-policy Interface', *Futures* 39(7): 807-826.

Van den Hove, S. and Sharman, M. (2006) 'Interfaces between Science and Policy for Environmental Governance: Lessons and Open Questions from the European Platform for Biodiversity Research Strategy', in Guimarães Pereira, Â., Guedes Vaz, S. and Tognetti, S. (eds) *Interfaces between Science and Society*. Sheffield: Greenleaf Publishing Ltd.

Vreugdenhil, J.J. (2003) *Stakeholder, Scientists, Scenarios and the Skills of Shaping Dialogue. Evaluation of the Scenario Development and the Stakeholder Dialogue in the ATEAM Project*. Unpublished MSc Thesis. Wageningen: Wageningen University.

Welp, M. et al. (2006a) 'Theoretical Approaches for Science-based Stakeholder Dialogues', *Global Environmental Change* 16(2): 115-234.

Welp, M. et al. (2006b) 'Science-based Stakeholder Dialogues in Climate Change Research' in S. Stoll-Kleemann and M. Welp (eds) *Stakeholder Involvement in Environmental Management, Policy Making and Research: Theory and Practice*, 213-40. Cambridge: Springer Verlag.

Zebisch, M., Grothmann, T., Schröter, D., Haße, C., Fritsch, U. and Cramer, W. (2005) *Climate Change in Germany – Vulnerability and Adaptation of Climate Sensitive Sectors*. Report commissioned by the Federal Environmental Agency, Germany (UFOPLAN 201 41 253). Potsdam: Potsdam Institute of Climate Impact Research. Report in German and English. URL (consulted January 2008): http://www.umweltbundesamt.de/index-e.htm

Authors information

Dr. Anne Cristina de la Vega-Leinert is a lecturer and researcher in global change environmental sciences issues. Since January 2008, she is responsible for the analysis and write up of the results of the GoBi (Governance of Biodiversity) Project. Her research focuses on synergies between local development issues, natural resource and biodiversity management in the context of global change.
Ernst Moritz Arndt University Greifswald, Institute of Geography and Geology, Friedrich-Ludwig-Jahnstr. 16, 17487 Greifswald, Germany
Email: ac.delavega@uni-greifswald.de

Dr. Dagmar Schröter is researcher and coordinator in the Sustainable Development Group of the Austrian Environmental Agency.
Umweltbundesamt GmbH, Vienna, Austria and George Perkins Marsh Institute, Clark University, USA.

Carvalho, Anabela (ed.) (2008) *Communicating Climate Change: Discourses, Mediations and Perceptions*. Braga: Centro de Estudos de Comunicação e Sociedade, Universidade do Minho
Available from: http://www.lasics.uminho.pt/ojs/index.php/climate_change

1

The challenges of communicating climate change

Anabela Carvalho

In an article from 2000 Sheldon Ungar stated that, unlike the ozone hole, climate change never generated a 'hot crisis'. Looking at the prominence of the issue in the national and international political agendas and the volume of media coverage that it has sustained in the last five years or so one is led to believe that things have changed. A series of remarkable events has contributed to transform climate change into one of the most high profile issues of the present moment: hurricane Katrina, Al Gore's film and book *An Inconvenient Truth*, the Nobel prize that was awarded jointly to him and to the IPCC, the *Stern Review on the Economics of Climate Change*, Live Earth, and the gloomy forecasts of the 4th IPCC Assessment Report all concurred to putting climate change on the media, the public's and the political agendas, which then tend to feed each other. In fact, multiple surveys indicate that people around the world are aware of the issue and very concerned, are willing to act upon it and expect politicians to take the lead. Yet, global greenhouse gas emissions have continued to rise rapidly.

The scientific, political and economic complexity of climate change brings up a number of challenges for communication, which are enhanced by the multiple time and spatial scales of the problem, the ethical, social and cultural values involved in decisions, and the urgent need for concerted action to mitigate greenhouse gas emissions. As recently shown by Moser and Dilling (2007), promoting social change to address climate change faces a number of hurdles but is ever more pressing. In this context, a number of questions beg for answers: What are the meanings associated with climate change in different parts of the world and how have those meanings been produced, reproduced and transformed? How have the media in different countries been representing this issue? How do people perceive it and to what extent are they integrating it into their actions? To what extent is climate change making us rethink our practices of consumption and mobility? What are the relations between political action or inaction and given forms of discursive construction of climate change?

Stemming from a conference that took place at the University of Minho on 19-20 November 2007 and from a research project entitled 'The Politics of Climate Change: Discourses and Representations', this book looks at three main aspects: the discourses of a variety of social actors on climate change, from scientists to religious leaders; the reconstruction of those discourses in the media and the multiple depictions of the issue in the press, television and the Internet; and people's perceptions, understandings and attitudes in relation to the issue. Most importantly, the book aims to contribute to understanding the circular relations between these three aspects: discourses, mediations and perceptions. The organization of the book in three parts corresponds to these themes and throughout the chapters, the links, connections and impacts between those three aspects keep coming to light.

The first study, by Anne Cristina de la Vega-Leinert and Dagmar Schröter, focuses on the communication between scientists and stakeholders on climate change. Reporting on the outcomes of a stakeholder dialogue in Germany, the authors examine the difficulties and the benefits associated to exchanging ideas with various types of people and the gains derived from the negotiations that occur in those processes. They highlight the challenges involved in bridging the language of science and the language of other social fields.

Mirjia Vihersalo's chapter is about the ways climate change was framed in policy statements in the Montreal summit of 2005. She concludes that there were two main frames. In one frame, climate change was considered as a problem of greenhouse gas emissions and therefore a treatable global problem, with an emphasis on economic measures. In the second frame, climate change was represented as a problem of vulnerability and scarce resources. Vihersalo also identifies the different forms of argumentation and the struggles associated to those two discourses. Her analysis shows that multiple understandings of climate change can be found in official discourses alone. Far from being seen as an environmental problem only, climate change is recurrently embedded with other issues, such as social and economic development, which shape meanings, standpoints and decisions in particular ways.

In the same line, Arjan (J.A.) Wardekker, Arthur C. Petersen and Jeroen P. van der Sluijs look at religious discourses on climate change in the USA and the arguments used to support or oppose strong policy on the issue. Given the weight of the evangelical community that is the focus of this study, the authors argue that it is worth paying more attention to the values underlying these discourses and how the same principles can be the basis for arguing for different outcomes.

Judy M. Ford looks at how cultural difference is discursively constructed and reinforced in ways that counter universal policy standards on climate change and that support various interests, including the maintenance of lifestyles and identities based on high-energy

consumption. She contrasts that with the universal values that are embedded in human relations to the environment and points out various universal motivators.

The second part of the book opens with a review of research on media and climate change by Astrid Dirikx and Dave Gelders. They start by discussing the roles of the media in the public perception of the issue with reference to various academic traditions, from agenda-setting studies to frame analysis. Dirikx and Gelders outline some of the key conclusions of existing research on media representations of climate change and conclude with a suggestion for more research in European countries. The research questions presented at the end of their paper constitute a promising agenda for investigating mediated discourses on climate change.

Cecilia Rosen Ferlini and Javier Crúz-Mena focus on the coverage of scientific knowledge on climate change in the print media and on the related social responsibilities of journalism. They propose evaluating news practices on climate change based on a 'functional model' that questions whether journalism provides citizens information needed to make relevant decisions. Their analysis of the representation of the IPCC's 2001 Assessment Report in three Mexican quality newspapers, leads to a dismaying picture as, unlike newspapers from other countries, they failed to inform about the key conclusions of the IPCC and hence, Rosen and Crúz-Mena argue, impaired readers' ability to make decisions in relation to climate change.

Based on the analysis of the representations of climate change in the Portuguese media in a set of critical moments, Anabela Carvalho and Eulália Pereira examine the discourses and 'discursive repertoires' circulating in the public sphere, and discuss the problems associated with representations of the issue in the press and television news. They also link those representations to the discourses of scientists, politicians and business people, among other social actors.

The third part of the book focuses on citizens' perceptions of climate change. Joop de Boer's paper examines the role of mental models in relation to climate change. Based on a wealth of data from European surveys, he concludes that climate change is widely perceived by people as a common cause of various changes in nature but that citizens do not have a clear understanding of the energy situation of their countries and that a frame for climate-proofing decisions is missing.

Using an extensive questionnaire to examine people's social representations of climate change and their relations with the media, Rosa Cabecinhas, Alexandra Lázaro and Anabela Carvalho conclude that the media are the main source of information on climate change and that patterns of use of information sources (type of source and frequency of use) are a predictor variable of levels of concern, behavioural engagement and knowledge on climate change, although they do not affect risk perceptions or the valence of images associated

with climate change (negative or positive). They point out that more research is needed on media consumption, social networks and social representations on climate change.

The book closes with a study by Wojciech Biernacki, Anita Bokwa, Boleslaw Domanski, Jarosław Dzialek, Karol Janas and Tomasz Padło. They examine perceptions of extreme 'natural' phenomena in Poland, namely floods, strong winds and landslides. Among other interesting results, they conclude that there is a common cognitive dissonance between the sense of risk and evaluation of personal responsibility in contributing to it, as in the case of construction of houses in floodplains. This may be an indication of the kind of denial strategies people may employ in dealing with the causes and the impacts of climate change. Biernacki et al also conclude that while the quality of the news about environmental issues is poor in Polish media they are the preferred means of information about extreme phenomena (in particular local mass media) and recommend that local authorities pay more attention to their role in the communication of risk.

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References

Moser, S. C. and Dilling, L. (eds) (2007) *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change*. Cambridge: Cambridge University Press.

Ungar, S. (2000) 'Knowledge, Ignorance and the Popular Culture: Climate Change Versus the Ozone Hole', *Public Understanding of Science* 9 (3): 297-312.

Author information

Anabela Carvalho (PhD, University College London) has done research on various aspects of the communication of climate change. Her interests also include the mediated communication of science, political and social issues, political communication and discourse analysis. She is Assistant Professor at the University of Minho and Chair of the Science and Environment Communication Section of the European Communication Research and Education Association (ECREA).

Institutional affiliation and contacts: Centro de Estudos de Comunicação e Sociedade, Universidade do Minho, Campus de Gualtar, 4710-057 Braga, Portugal

Email: carvalho@ics.uminho.pt