Kevin Burchell

Fractured environments: diversity and conflict in perceptions of environmental risks
Working Paper

http://eprints.lse.ac.uk

Fractured Environments:
Diversity and conflict in perceptions of
environmental risk

Kevin Burchell

November 1998

'The tree which moves some to tears of joy is in the eyes of others only a green thing that stands in the way'

(William Blake 1799 in ESRU 1998)

Fractured environments: diversity and conflict in perceptions of environmental risk

Kevin Burchell[1]

Abstract

This paper reinforces existing notions that conflicts surrounding environmental risk are the result of seemingly contradictory theoretical approaches (realist and constructionist) and of diverse perceptions of environmental risk, which tend to reflect issues of power and status. It is suggested that an integrated theoretical approach may offer opportunities for the resolution and avoidance of conflict surrounding environmental risk. Proposals are made for the further development of cultural theory as a typology of orienting mechanisms that explain individuals' perceptions of environmental risk. The efficacy of the psychometric paradigm as an appropriate tool for the exploration of environmental risk perception is questioned and a future research agenda is proposed.

1.   Introduction

1.1.   *The risk paradox and late-modernity*

This paper is concerned with environmental risk. In particular, it is concerned with how and why different people construct the same risks in different ways and the implications that this has for society as a whole. The notion of risk appears to be central to concepts of late-modernity. Modern confidence in progress, rationality, positivism, and objective truth and knowledge have all been undermined and eroded. Post-war socio-economic certainties, such as family structures, class and gender roles, job security and political ideologies, have collapsed. And, perhaps most importantly, the contemporary environmental crisis has rocked the, apparently solid, industrial, scientific and technological foundations upon which modern society is based, and perhaps even threatens modern society itself. What's left, it seems, is subjectivity, uncertainty, diversity...and risk.

In his compelling and influential *risk society* theory, the arch late-modernist, Ulrich Beck (1994, p. 8), celebrates this 'return to uncertainty'. However, at the same time, Beck himself is objective and certain about the environmental crisis, and he seeks to universalise environmental risk by describing 'a society marching under the banner "We are scared"' (1992). Unfortunately for Beck, contemporary theoretical and empirical work on environmental risk construction refuses to bear out this vision. According to this body of work, late-modern society is not universally scared; rather, environmental risk is a highly subjective and uncertain phenomena. The paradox is that, despite this, Beck is right to be concerned; 'people do die' (Dake, 1992, p. 33) and 'people are getting hurt or killed' (Renn, 1992, p. 61) as a result of the environmental risks that they face.

In this paper, I have theoretical, empirical and practical objectives. Theoretically, I engage with contemporary debates surrounding environmental risk; in particular, I examine the political implications of the ontological paradox, illustrated above, that environmental risk is, somehow at the same time, both objectively real and subjectively constructed. Empirically, within particular strands of the theoretical framework, I contribute in a small, but hopefully original, way to the growing body of empirical work that examines how individuals might construct environmental risk. Practically, this paper proposes a research agenda to address some of the issues raised. However, before embarking upon these objectives, it is essential to provide a conceptual framework for the theoretical substance and the empirical methodology of the paper.

1.2. Conceptual framework and values

The conceptual framework from which this paper is written stems, to some extent, from aspects of postmodern perspectives derived from the work of structuralists, such as Saussure and Lévi-Strauss, and poststructuralists, such as Derrida, Lyotard and Foucault. Although divergent in many respects, and despite postmoderity's 'chequered career at the cutting edge of social theory' (Hannigan, 1995, p. 178), this body of work has some common tenets that are substantively and methodologically important. See Gare (1995, pp. 36-72), Giddens (1987, pp. 73-108), Lyotard (1994), Sayer (1992) and Seidman (1994).

The epistemic and ontological focus of this perspective is on the subjective nature of knowledge and perceptions of how the world is. This derives from the notion that language is a contextual system of signs that is distinct from, and has only an arbitrary relationship to, that which is signified in the real world. Since knowledge and perception are primarily represented through language (Sayer, 1992, p. 6), they become equally subjective, contextual and arbitrary; what Sayer (1992, p. 60) terms 'context-dependent', rather than universal.

Thus, the seemingly immutable power structures inevitable within language and knowledge (Olsson, 1987, p. 249), and modern notions of universal, objective knowledge, are challenged by such perspectives. The legitimacy of dominant knowledge and perceptions, such as those produced by science, experts (including social scientists) and other dominant groups is questioned, and 'marginal' knowledge and perceptions, such as that produced by unscientific, lay and 'marginal' groups is given greater legitimacy. This leads, inevitably, to conflict and contestation. As was suggested earlier, and shall be examined more closely later, the substantive aspect of this paper, environmental risk, represents a prime example of this (Hannigan, 1995 and Gandy, 1997).[2]

Turning to methodological considerations, acknowledgement of the 'context-dependent' nature of knowledge also undermines the notion of the objective researcher. Since the researcher is inevitably 'conceptually saturated' (Sayer, 1992, p. 53), that is working within specific theoretical and experiential contexts (or what Haraway (1996) delightfully calls 'wormholes'), the researcher is limited to interpretations within this context and cannot be expected to be an objective recorder and interpreter of new facts. Based upon these observations, seven points might be made about the nature of knowledge with respect to social science research, as shown in Box 1.

Such realisations, when taken to extremes, may suggest that knowledge is such an unreliable phenomena that its production is not worthwhile. Fortunately, this is not the case,

as Sayer (1992, p. 5) puts it, 'knowledge is not immune to empirical check, and its effectiveness in informing and explaining...is not mere accident'. Clearly, though, the production of knowledge needs to be undertaken within a framework that is *realistic about its fallibility*.

This might be achieved in a number of ways. Sayer (1992, p. 65) suggests that a 'realistic approach' to social science research might endeavour to establish 'practically-adequate' knowledge; that is contextual, yet intersubjectively intelligible knowledge, rather than truth. Rydin (1998) adds that this may be achieved through the interaction of different knowledges. A realistic approach might also be reflected in commitments to 'look at contrary evidence', possibly from unscientific, lay or 'marginal' sources, to 'clarification and classification of the *values* [my italics] underlying the research', to 'accurate reporting of all processes employed and [explicit] separation of simple reporting and interpretation (Eichler, 1988, pp. 13-4 in Robson, 1993, pp. 65-6), and to fully embed the research in theory (Gilbert, 1993, p. 18). It is hoped that the reader will pick up the ways in which these aspirations have been put into practice in this paper.

1. The world exists independently of knowledge of it.
2. Knowledge of the world is contextual, subjective, fallible and theory-laden.
3. Knowledge cannot be gained purely through observation of the world.
4. Knowledge cannot be adequately reflected in language.
5. Scientific, expert and dominant group knowledge cannot be assumed to be the highest, most objective form of knowledge.
6. Knowledge cannot be considered within a stable, universal framework.
7. Knowledge and the production of knowledge are social constructs and are, therefore, characterised by relations of power.

Box 1. The implications for knowledge of aspects of postmodern perspectives (adapted from Sayer, 1992, pp. 5-6 and 13).

With respect to the personal values underlying this research, several points can be made. I do perceive considerable environmental risk; not of global proportions perhaps, in the style of global warming or ozone depletion, but certainly in the sense of steadily deteriorating local environmental conditions, manifested as air pollution, water pollution, concerns over food production, the commodification of land/nature and so on. For me, such issues cannot be separated from the more damaging dynamics of the modern, capitalist, industrial society in which we live. In my more contemplative moments, I also associate this with a loss of spirituality in society which I would link, to some extent, with a damaging, modern distancing of society from nature.

As far as I can tell, society's response to environmental problems appears to be an unsatisfactory technocratic and modern one. It is perhaps for this reason that I am attracted to some of the theoretical and practical insights that a postmodern perspective can provide, such as the constructionist approach to environmental risk that features strongly in this paper and the comments about the inadequacy of knowledge discussed earlier.

1.3.   The technical approach to environmental risk

Environmental risks can be characterised as threats to society that accrue from the interaction of technology and nature. In a western urban context, this covers a multitude of sins, including air and water pollution, food safety, noise, technological accidents, waste facilities, global warming, acid rain and ozone depletion.

As Benton and Redclift (1994), and Lash, Szerszynski and Wynne (1996) suggest, the dominant response to contemporary environmental risk has been a technical, functional and positivistic endeavour to establish 'the status of current threats' (Lash *et al.*, 1996, p. 1). 'Risk professionals' (Dietz and Rycroft 1987 in Hannigan, 1995, p. 92) - scientists, epidemiologists, engineers, actuaries, economists and others - are charged with producing qualitative, neutral and objective *risk assessments*; defined as, 'a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequences of the occurrence' (Royal Society, 1992, p. 4). Such assessments are used for *risk management* - to support health and safety policy decisions, and to minimise environmental degradation, and for *risk communication* - to convince a sceptical public of the safety of various technologies (see Renn, 1992, pp. 58-64 and Royal Society, 1992).

This 'technocentric' (O'Riordan, 1981) approach to environmental risk reflects distinct ontological and epistemological perspectives. Ontologically, this approach assumes that

nature exists 'out there' (Irwin, 1997, p. 219), distinct and disembedded from society and culture, and that environmental risk is the real, quantifiable product of society's impact on nature. This dualistic view leads to the 'realist' epistemic assumption that human knowledge of nature and, therefore, environmental risk can also be singular, neutral and objective. The affect of this approach has been to 'evacuate them [environmental challenges] of any social or cultural meanings' and to construe them instead in terms of technological management with no quarter given to cultural heterogeneity (Lash *et al*., 1996, p. 4). It is not surprising, therefore, that risk professionals express frustration at the consistent failure of the general public to be convinced by their risk management and risk communication efforts. Slovic (1993, p. 677) quotes BL Cohen *Before it's too late: a scientist's case for nuclear energy* (1983) as typical of this frustration:

> 'the major reason for public misunderstanding of nuclear power is a grossly unjustified fear from the hazards from radioactive waste...there is general agreement among those scientists involved with waste management that radioactive waste disposal is a rather trivial technical problem.'

According to Paul Slovic and his colleagues, such conflict emerges because experts and the public have 'vastly different conceptual framework[s] in which their opinions are formed' (Flynn, Slovic and Mertz, 1993, p. 643) (one is reminded here of Haraway's aforementioned 'wormholes'). As a result of this, risk professionals conduct their risk management and risk communication activities in manners which can appear untrustworthy to the public. In combination with the fact that trust is difficult to build and easy to destroy (Slovic, 1993a; 1997), the issue of trust becomes of vital importance with respect to perceptions of environmental risk.

1.4.   Beyond the technical: the constructionist approach

The key challenge to the technical perspective springs from the constructionist approach. This perspective suggests a rather less stable epistemology and ontology. In contrast to the traditional view, nature is 'in here' (Irwin, 1997, p. 219); part of, interrelated to and interdependent on society. The implication of this is that social understanding, knowledge and perception of both nature and environmental risk cannot be neutral and objective. Rather it will be subjective; shaped and constructed by cultural, social, economic, political and psychological factors.

In his excellent book, *Environmental sociology: a social constructionist perspective*, John Hannigan (1995) analyses the way in which society constructs environmental risks. The constructionist approach to the environment takes its inspiration from constructionist challenges to the functionalist view of social problems, such as crime, divorce and mental illness (see, for example, Spector and Kitsuse, 1973 in Hannigan, 1995). Whereas the functionalist view sees these issues as 'readily identifiable, distinctive and visible objective conditions [ripe for the application of] scientific methods to locate and analyse these moral violations and advise policy-makers on how best to cope' (p32), the constructionist approach concentrates upon the processes by which issues are 'assembled, presented and contested' (p187) as problems. In the context of the environment, Hannigan (1995, p. 30) puts it thus: 'social constructionism does not uncritically accept the existence of an environmental crisis brought on by unchecked population growth, over-production, dangerous technologies, etc. Instead, it focuses on the social, political and cultural processes by which environmental conditions are defined as being unacceptably risky and therefore actionable.'

Hannigan argues that six conditions are required for the successful construction of an environmental risk by society; these are shown in Box 2. It is not my intention here to debate the merits of Hannigan's list, although it is certainly worth considering the extent to which the existence of *political* incentives for taking positive action is required for successful environmental risk construction. Hannigan's list is interesting, however, in the context of the earlier conceptual debate concerning the legitimacy of rival knowledge, since it suggests that knowledge presented by 'popularisers' and the media is as important as that presented by science. This notion is more fully developed by Wynne (1992; 1996) who calls for a general levelling of the hierarchy of expert over lay rationality, legitimacy and knowledge in attempts to deal with environmental issues. Wynne cites two UK examples, debates over the herbicide 2,4,5-T and the protection of Cumbrian sheep in the aftermath of the Chernobyl nuclear accident, in which experts detrimentally ignored and derided the practical lay knowledge of farm and forest workers, and Cumbrian hill farmers respectively.

1. Scientific validation of risk claims.

2. Existence of 'popularisers', such as Jonathan Porritt.

3. Supportive media attention.

4. Dramatisation of the problem in symbolic or visual terms, for example, the 'ozone hole'.

5. Economic incentives for taking positive action.

6. Existence of institutional sponsors, such as the United Nations or NGOs.

Box 2.   The necessary factors for the successful construction of an environmental risk (adapted from Hannigan, 1995, pp. 54-6).

Dake (1992, p. 24) suggests that environmental risk is 'politically negotiated', Slovic (1997, p. 308) that 'defining [environmental risk] is an exercise in power'. By analysing the arenas, actors, and socio-political power relations of risk construction, using large scale examples (such as acid rain and bovine growth hormone) and small scale examples (such as public meetings on local environmental issues such as waste facilities or river pollution), Hannigan's constructionist approach to environmental risk shows the extent to which this is the case. Nowhere are these power-relations more graphically exposed than in the reports from stage-managed public meetings relating to local environmental issues in Box 3.

However, the constructionist approach, with its emphasis on social processes, can be charged with cultural relativism (Benton, 1994) and political naivety because it seemingly denies the reality of environmental risk (Kaprow, 1985 in Dake, 1992). In countering this, constructionists appear to acknowledge that risk is real. Hannigan (1995, p. 30) states that, 'environmental risks and problems as socially constructed entities need not undercut legitimate claims about the condition of the environment, thereby denying them an objective reality' and reminds us that 'both valid and invalid social problem claims have to be constructed'; and, as has been mentioned, Dake (1992, p. 33) is startlingly realist as he reminds us that 'people do die'.

The two main strands of work that run counter to the technical notion of risk are the highly constructionist *cultural theory* of anthropologist, Mary Douglas and political scientist, Aaron Wildavsky, and psychologist, Paul Slovic's, *psychometric paradigm*.

Public information meetings or hearings are routinely stage-managed by risk generators and arbiters. At public meetings concerning the building of a sewage detention tank on Lake Ontario [which Hannigan attended as a local resident], members of the public works department, local politicians (who strongly supported the project) and representatives of the private engineering firm who had recommended the building of the tanks all sat together on the elevated stage of the auditorium whose perimeters were adorned with charts, blown-up photographs and other 'props'. We citizens were restricted to a single question with no follow-up. Those who queried the suitability of the project were alternately bullied or patronised. On contentious issues the presenters did not hesitate to introduce a ream of previously unseen statistical evidence which we had no way of confirming or denying without days or weeks of further research.

Kaminstein (1988) argues that embodied in the public presentation of scientific information at meetings concerning the health and safety aspects of toxic waste dumps is a rhetoric of containment which restricts discussion, avoids tough questions and pursues its own agenda. Drawing on three years of observations at EPA (Environmental Protection Agency) meetings held to inform residents of Pitman, new Jersey, about the steps which were being taken to clean up the Lipari landfill, the site of one of the worst dumps in the United States, Kaminstein concludes that residents were not so much informed or persuaded as controlled and defeated. The primary tool which scientific experts associated with the EPA and the Centers for Disease Control used to stifle citizen initiatives was toxic talk - talk which stifles discussion and smothers public concern. The rhetoric of containment has multiple elements.

First, residents were bombarded with technical information. At one meeting, EPA officials gave out documents totalling forty-four pages. Those in attendance were expected to assimilate an array of data, charts, graphs, tables and a slide show in rapid succession. At the same time, the facts that residents wanted were never available and no explanation or interpretation was given as to the information which the consultant scientists presented.

At the front of the room was a large dais raised about two feet, a long table and nine large, high-backed chairs on which the scientists sat, creating a physical and psychological distance from the audience. Various dramatic props, for example, an enlarged photograph of an air monitoring vehicle which looked like a recreational camper, were employed as rhetorical devices to pacify the residents and enhance the power of those in charge of the meeting.

The factual presentation style used by EPA officials and scientists was abstract, impersonal and technical, thus creating an impression of professional neutrality. It was the activist residents who became angry and confontative, allowing officials to dismiss them as 'emotional'. Questions which dealt with the geology and hydrology of the area, future tests and plans for the clean-up were addressed but those which dealt with health risks were avoided or deflected. Officials and scientists used language in their presentations which was technical, ambiguous and intellectual, making it impossible for any meaningful dialogue to develop between the experts and residents over the nature and magnitude of the risks faced by the residents of Pitman.

Box 3. Reports from public meetings on local environmental issues in North America (Hannigan, 1995, pp. 104-6).

1.4.1.   Cultural theory

In *Risk and culture: an essay on the selection of technological and environmental dangers*, Douglas and Wildavsky (1982, p. 8) attempt to understand 'how particular kinds of danger come to be selected for attention'. Cultural theory was further developed in Schwarz and Thompson's *Divided we stand* (1990) and Thompson, Ellis and Wildavsky's *Cultural theory* (1990), by integrating the work of Douglas and Wildavsky with Holling's 'myths of nature' (1979, 1986 in Adam, 1995). See also the reviews in Dake and Wildavsky (1990), Dake (1992), Raynor (1992), Renn (1992), Royal Society (1992), Adam (1994), Hannigan (1995), Peters and Slovic (1996), and Ellis and Thompson (1997).

Cultural theory is perhaps the most constructionist and structural perspective on risk (Renn, 1992). Although not explicit, the links with the conceptual framework described earlier are clear; as Douglas and Wildavsky (1982, p. 186) suggest, within this perspective, 'perceptions of risk...are collective constructs, a bit like *language* [my italics]'. Cultural theory proposes that distinct patterns are discernible in cultural constructions of risk and that these are closely related to cultural worldviews and 'myths of nature'.

As Figure 1 shows, cultural theory relies upon a bi-axial typology. The horizontal axis represents a continuum from individualized to collectivized beliefs, and the vertical a continuum from belief in prescribed behaviour and inequality to belief in non-prescribed behaviour and equality. Each of the four sections of the typology contains a worldview developed from Douglas and Wildavsky: individualist, egalitarian, hierarchist and fatalist, and a corresponding 'myth of nature' developed from Holling: nature benign, nature ephemeral, nature perverse/tolerant and nature capricious respectively. In each 'myth of nature' the status of nature is represented graphically by a ball and line. Extensive investigation of these worldviews and 'myths of nature' is presented in *Divided we stand* and *Cultural theory*; Table 1 presents a summary of these in two parts.

Prescribed behaviour/
Inequality

Nature capricious

THE FATALIST

Nature perverse/tolerant

THE HIERARCHIST

Individualized

Collectivized

Nature benign

THE INDIVIDUALIST

Nature ephemeral

THE EGALATARIAN

Non-prescribed behaviour/
Equality

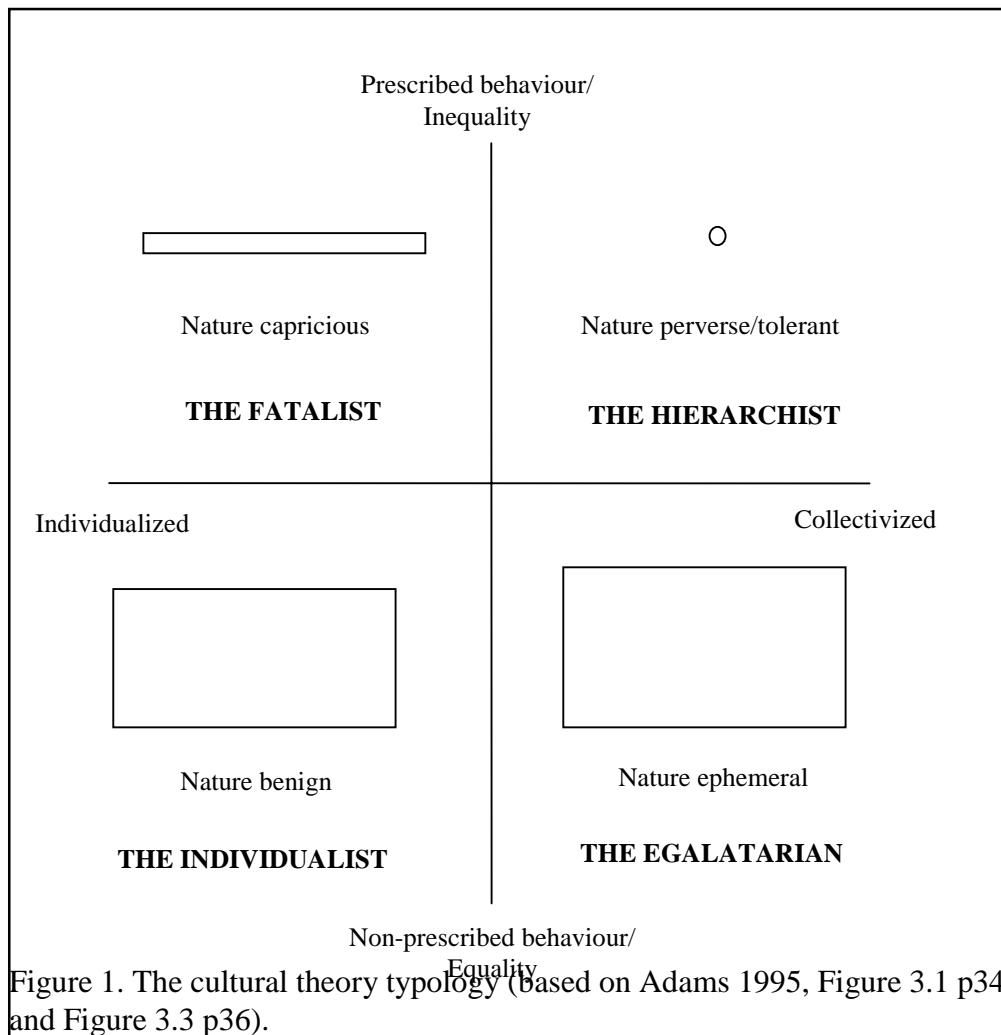Figure 1. The cultural theory typology (based on Adams 1995, Figure 3.1 p34 and Figure 3.3 p36).

Table 1. Part 1.

The cultural theory typology (Individualists and Egalitarians)

(based on Adams, 1995, pp. 34-6).

	Individualists	**Egalitarians**
Worldview	Enterprising "self-made" people, relatively free from control by others, and strive to control their environment and the people in it. Their success is often measured by wealth and the number of followers they can command.	Have strong group loyalties but little respect for externally imposed rules, other than those imposed by nature. Group decisions are arrived at democratically and leaders rule by force of personality and persuasion.
Typical member	The self-made Victorian mill owner would make a good representative of this category.	Members of religious sects, communards, and environmental pressure groups all belong to this category.
Myth of nature	Nature benign: nature, according to this myth, is predictable, bountiful, robust, stable, and forgiving of any insults humankind might inflict upon it; however violently it might be shaken, the ball comes safely to rest in the bottom of the basin. Nature is the benign context of human activity, not something that need to be managed.	Nature ephemeral: here nature is fragile, precarious and unforgiving. It is in danger of being provoked by human carelessness into catastrophic collapse. The objective of environmental management is the protection of nature from humans. People, the myth insists, must tread lightly on the Earth.
Management style	The management style associated with this myth is therefore relaxed, non-interventionist, laissez-faire.	The guiding management rule is the precautionary principle.

Table 1. Part 2.

The cultural theory typology (Hierarchists and Fatalists)

(based on Adams, 1995, pp. 34-6).

	Hierarchists	**Fatalists**
Worldview	Inhabit a world with strong group boundaries and prescribing restrictions. Social relationships in this world are hierarchical, with everyone knowing his or her place.	Have minimal control over their lives. They belong to no groups responsible for the decisions that rule their lives. They are resigned to their fate and they see no point in attempting to change it.
Typical member	Members of caste-bound Hindu society, soldiers of all ranks, and civil servants, are exemplars of this category.	Non-unionized employees, outcasts, and the socially-excluded are representative of this category.
Myth of nature	Nature perverse/tolerant: this is a combination of modified versions of the first two myths. Within limits, nature can be relied upon to behave predictably. It is forgiving of modest shocks to the system, but care must be taken not to knock the ball over the rim. Regulation is required to prevent major excesses, while leaving the system to look after itself in minor matters.	Nature capricious: nature is unpredictable. The appropriate management style is again laissez-faire, in the sense that there is no point to management. Whereas adherents to the myth of nature benign trust nature to be kind and generous, the believer in nature capricious is agnostic; the future may well turn out well or badly, but it is beyond his or her control.
Management style	The manager's style is interventionist.	The non-manager's motto is que sera sera.

Cultural theory contends that what societies choose to call risky is determined by social and cultural factors, not by nature. Further, it suggests that debates over environmental risk, such as that between risk professionals and the general public, in which each side charges the other with stupidity and irrationality, can on inspection be attributed to opposing worldviews and 'myths of nature' rooted in culture. As the Reverend Sydney Smith (in Adams, 1995, p. 50) remarked of two women arguing with each other from their doorsteps, 'They'll never agree with each other; they're arguing from different premises.'

As a constructionist approach, cultural theory has been subject to the criticisms mentioned earlier; in addition, it has been criticised for cultural determinism and stereotyping. Raynor (1992, p. 106-7) counters that cultural theory does not imply 'that culture locks individuals into a particular worldview', rather it assumes that 'cultural bias is unavoidable'. However, Raynor acknowledges a certain degree of stereotyping but argues that the categories of bias are, in reality, limited. Dake (1992 p33) answers charges of stereotyping by stressing the positive aspects of the typology: 'that the worldviews provide powerful cultural lenses, magnifying one danger, obscuring another threat'. Adams (1995, p. 64) is critical of the tautologies of cultural theory: 'Ultimately, it is not clear whether people are fatalists because they feel they have no control over their lives, or they feel they have no control because they are fatalists'. This is a frustration I shared when I came to consider the results of the present research.

1.4.2. *The psychometric paradigm*

The psychometric paradigm of risk is primarily associated with the work over the past twenty years of Paul Slovic and his colleagues at Decision Research and the University of Oregon. Helpful reviews of this work are provided by Renn (1992), Royal Society (1992), and Slovic (1992; 1993b).

Although the psychometric paradigm concurs with cultural theory's assumption that 'there is no such thing as "real" risk or "objective" risk' (Slovic, 1992, p. 119), it places far greater emphasis on individual agency in risk construction. As its name suggests, the methodology of this approach relies heavily upon psychometric questionnaire scales. Early empirical work theorises that risk perception is largely based upon cognitive responses to characteristics of the risk itself.[3] Kasperson (1992), and Renn, Burns, Kasperson, Kasperson, and Slovic (1992) develop this idea, within the concept of the *social amplification of risk*, noting that risk perception, as well as being associated with risk characteristics, is also related

to cultural conditions and media coverage. However, although all of this work acknowledges that risk cannot be objective, it also assumes that, based upon a given risk characteristics, cultural context and level of media coverage, risk perception will be a more-or-less homogeneous phenomena.

1.4.3. Individual characteristics and the construction of environmental risk

More recent psychometric research posits a very different theory; namely, that risk *construction* is largely based upon demographic attributes, individualized cultural theory worldviews, and other attitudinal factors. In his PhD thesis Karl Dake (1990 in Dake, 1992) developed psychometric tools to measure individuals in relation to the four worldviews of cultural theory. Within this context, an individual's worldview is best seen as a 'lens' (Dake, 1992, p. 33) or a 'filter' (Peters and Slovic, 1996, p. 1446) through which she or he judges, responds to and interacts with the world. Since then a body of empirical work that examines environmental risk construction, worldviews, demographic characteristics and other attitudinal factors, largely using the psychometric approach has been built in North America. The findings of this work are summarised in Table 2.

As Table 2 shows, with respect to worldviews, this body of work consistently shows that greater environmental risks are perceived by egalitarians than by hierarchists, fatalists and individualists. This is perhaps unsurprising given the egalitarian 'myth of nature' as 'fragile, precarious and unforgiving' (Adams, 1995, p. 34). However, as Wildavsky and Dake (1990, p. 51) point out, this does not mean that the other groups do not perceive other risks, for example in their study, 'social deviance is deemed most dangerous to hierarchists, and the threat of war...is most feared by individualists'. Turning to demographic characteristics, as Table 2 shows, this body of research suggests that women and disadvantaged 'racial' groups have perceptions of greater risk, than white men. There appear to be two key reasons for this: actual environmental conditions, and dynamics of power, status and trust.

Table 2.

Summary of recent psychometric work on the perception of environmental risk.

Variable	Group with perception of greater environmental risk	Studies
Worldviews	People with egalitarian worldview.	Dake and Wildavsky (1990), Dake (1992), Palmer (1996), Peters and Slovic (1996), and Ellis and Thompson (1997).
Demographics		
Gender	Women.	Baldassare and Katz (1992), Stern *et al.* (1993), Flynn *et al.* (1994), McGregor *et al.* (1994), Bassett *et al.* (1996), and Davidson and Freudenburg (1996).
'Race'	Disadvantaged 'racial' groups. Aboriginals.	Savage (1993) and Flynn, Slovic and Mertz (1994). Hine *et al.* (1997).
Neighbourhood	People living in environmentally-stressed neighbourhoods.	Greenberg and Schneider (1995).
Political orientation	People with liberal political orientations.	Baldassare and Katz (1992), and Ellis and Thompson (1997).
Attitudes		
Trust in gov/exp/sci	People with less trust of experts, science and government.	Flynn, Slovic and Mertz (1994), Davidson and Freudenburg (1996), Greenberg and Schneider (1997), and Hine *et al.* (1997).
Techno. Enthusiasm	People with less enthusiasm for science and technology.	Peters and Slovic (1996) and Hine *et al.* (1997).
Concerns about reg. System.	People who are more concerned about the regulatory system surrounding environmental risk.	Peters and Slovic (1996).

Adeola (1994) and Zimmerman (1993) present empirical evidence that disadvantaged 'racial' groups are more likely to live in areas containing hazardous waste and petrochemical facilities.[4] Clearly, this would seem to go a long way to explaining the greater perception of environmental risk found among disadvantaged 'racial' groups in Flynn, Slovic and Mertz's (1994) US-wide survey. However, Greenberg and Schneider's (1995) work suggests that, in good environmental conditions, women and disadvantaged 'racial' groups still have greater perceptions of environmental risk than do men. As Davidson and Freudenburg (1996, p. 332) put it in their review of 75 US studies of the gender aspects of environmental risk, 'There is a need to go beyond asking only why women worry so much; clearly, the time has come to ask why at least some White men do not'.

For Flynn, Slovic and Mertz (1994, p. 1101), the answer to this question appears to be bound up in dynamics of 'socio-political factors such as power, status, alienation and trust.' As Slovic (1993a and 1997) notes, perception of greater risk has been shown to correlate with lower levels of trust in experts, government and science, with greater concerns for the regulatory system surrounding environmental risk and with a lack of technological enthusiasm. In turn, these attitudinal concepts also appear to be associated with gender, race and worldviews as described above. Davidson and Freudenburg's (1996) review shows that 'women tend to be more distrustful than men of institutions, particularly those involving science, technology and government' (p. 319).[5] This body of work suggests that greater perceptions of risk and lower levels of trust are directly related to the lesser power and lower status that women and disadvantaged 'racial' groups have in US society. Or, as Flynn, Slovic and Mertz (1994, p. 1107) put it, 'Perhaps white males see less risk in the world because they create manage, control and benefit from so much of it. Perhaps women and non-white men see the world as more dangerous because in many ways they are more vulnerable, because they benefit less from many of its technologies and institutions, and because they have less power and control.'

1.5.   *Fractured environments*

To summarise, by reviewing empirical work, this chapter has reinforced the theoretical paradox that environmental risk can be considered, somehow at the same time, to be both real and constructed. This suggests that we must be wary of referring

to 'the environment'; rather, we should perhaps refer to 'environments' that are multiple and diverse. This chapter has also shown that such multiple environments inevitably lead to conflict and contestation. It is for this reason that I refer to 'fractured environments'; that is, environments that are both multiple and riven with conflict.

The following section describes how the theoretical and empirical issues raised in this chapter were formulated into research objectives and questions in the present research.

2. The present research

2.1. *Research objectives and question*

As has been suggested, this research had short- and long-term objectives. In the short-term, the objective of the research was to contribute to and extend the growing body of empirical psychometric work that examines the relationships between perception of environmental risk, worldviews, demographic/socio-economic characteristics, and other attitudinal factors.

In particular, the research aimed to replicate certain aspects of the studies by Flynn, Slovic and Mertz (1994) and Peters and Slovic (1996). These studies used the same dataset, collected from 1,512 individuals across the US between November 1992 and February 1993, on demographic characteristics, worldviews, attitudes in various other areas, and perceptions of a variety of health risks. The present research did this in a new geographical context; the Thamesfield, West Putney and East Putney wards in the Putney area of the London Borough of Wandsworth in south west London.

It is expected that this work will be of interest to geographers, social psychologists, sociologists and anthropologists. It is also hoped that the research will be of interest to risk professionals who are concerned about why and how public perceptions of risk can be so different from their own.

The longer term objective of this work was to familiarise myself with the theoretical, conceptual and methodological underpinnings of this approach to risk perception in order to identify areas for further research. In particular, questions are

asked as to the efficacy of the psychometric approach in understanding the complex mix of social, political, economic, psychological and conceptual orientations that contribute towards individuals' construction of environmental risk.

With these research objectives in mind, the following research question was considered suitable for the design of a survey and the formulation of hypotheses:

> What relationships exist between perceptions of environmental risk and demographic/socio-economic characteristics, worldviews, trust in experts/government/science, concerns about equity and fairness in the regulatory system, and technological enthusiasm?

2.2. Methodology

A self-completion questionnaire was constructed based upon the research tool devised by Flynn, Mertz and Slovic (1994). The questionnaire contained four main sections, as follows:

Two sections addressing *perception of risk* and *personal autonomy with respect to environmental risk* each used a five point Likert scale to measure the degree of risk that respondents perceived from the same twenty hazards (seventeen environmental/technological plus Crime, Economic uncertainty and Terrorism). These hazards were selected based upon sourced questionnaires and local conditions.

A further section contained Likert scales designed to measure the key concepts identified in the introduction: the worldviews (fatalist, hierarchist, egalitarian and individualist; based upon the statements developed by Karl Dake (1992)), trust of experts/science/government, concerns about the regulatory system surrounding environmental risks, and technological enthusiasm. These statements were adapted to the UK context from those devised by Flynn, Mertz and Slovic (1994). The twenty five statements and the concepts for which they are indicators can be reviewed in Box 4.[6]

Demographic and socio-economic information was also collected. This section was based upon the questionnaires used in the surveys reported in Table 2. Information on age, gender, ethnic group, type of property lived in, tenure, education, annual income and voting intentions was collected. In addition, the Bem femininity scale, developed by Daryl and Sandra Bem (Paul Slovic, 1998, *personal communication*), was used. This scale contains five items that are stereotypically

considered to be feminine (understanding, gentle, compassionate, sensitive to the needs of others, and warm) and five that are stereotypically considered to be masculine (independent, ambitious, competitive, a leader, and a strong personality). The objective of the scale is to construct a self-reported, stereotypical measure of femininity/masculinity that is independent of gender. It was expected that higher measures of femininity will correlate with higher perceptions of environmesntal risk.

In May 1998, following a small pilot study and discussions with experts in the feild, Professor Paul Slovic at The University of Oregon, Michael Greenberg at Rutgers University in New Jersey and Don Hine at New England University in New South Wales, questionnaire packages were hand-delivered to a systematically selected sample of 500.

Worldviews

Fatalist

- People can offset health risks from pollution by improving their individual lifestyles, for example by exercising and eating properly. (number 46 in questionnaire)

- I feel that I have very little control over risks to my health. (49)

- It's no use worrying about public affairs, I can't do anything about them anyway. (61)

Hierarchist

- People in positions of authority tend to abuse their power. (41)

- We need to pull together and support the choices the government makes. (47)

- Those in power often withhold information about things that are harmful to us. (53)

Egalitarian

- If people were treated equally, society would have fewer problems. (42)

- What this world needs is a more equal distribution of wealth. (48)

- We have gone too far in pushing for equal rights. (54)

Individualist

- In a fair system people with more ability should earn more. (57)

- I admire those who attempt to be independent and self-sufficient by growing their own food. (58)

- Government has no right to regulate people's personal risk-taking activities such as mountain climbing, hang-gliding and so on. (60)

Box 4. Statements used in the questionnaire (continued over).

Trust in experts/government/science

- Experts are able to make accurate estimates about environmental and technological risks. (43)

- Differences of opinion about environmental risks can be resolved by scientific data and analysis. (45)

- If a scientific study produces evidence that a substance is harmful to humans, we can be sure that we will be told about it. (50)

- Our government and industry can be trusted with making the proper decisions regarding managing environmental and technological risks. (52)

- Decisions about health risks should be left to the experts. (55)

- Scientists are able to make accurate estimates about environmental and technological risks. (56)

- Unless public health officials alert me, I don't really have to worry about environmental health problems. (59)

Equity and fairness

- The public should be able to vote on issues of environmental risk. (62)

- When the risk is very small, it is OK for society to impose risks on individuals without their consent. (63)

- People living near the source of a potential environmental risk, for example and waste disposal plant, should have the authority to close the plant if they think it is not being run properly. (64)

- The process of approving the development of plants that might have an environmental risk provides adequate opportunity for the public to have their concerns considered. (65)

Technological enthusiasm

- A high technology society is important for our health and well-being. (44)

- Technological development is destroying nature. (51)

Box 4 continued.   Statements used in the questionnaire.

2.3   Results

As was suggested in the introduction, the distinction between reporting and interpretation will be emphasised as much as possible in this paper. With this in mind, this section should be regarded as a report of the results, while the following section should be read as interpretation.

Two objections can be raised regarding the validity of these results. The first relates to sampling problems which led to the under representation of purpose-built and converted flats in the sample compared to the population. The second relates to the response rate; a disappointing 81 (16.2%).

Statistical analysis was undertaken in SPSS 7.5.2. and, following a preliminary *factor analysis*, of the twelve statements relating to the worldviews, took the form of an analysis of the relationships between the various components of the questionnaire.

2.3.1. Preliminary factor analysis

The number of factors retained was largely guided by the theoretical interpretability of the factors. This can be said to be the factors upon which statements load with coefficients greater than .4. This led to the adoption of a three factor solution, as shown in Table 3. This solution was also adopted because it accounts for a considerable proportion of the variance (45.36%, compared to 37.10% in Peters and Slovic's solution) and because it maximises the Cronbach's alpha coefficients of internal reliability (totalling 1.63, compared to 1.52 in Peters and Slovic's solution). While Bryman and Cramer (1997) suggest that Cronbach's alpha coefficients of .8 or more might be required to establish internal reliability, as Peters and Slovic (1996) point out, in this case the coefficients are necessarily low due to the small number of statements in each factor. In this case, the relatively small N might also contribute to the lower alpha coefficients.

As Table 3 shows, the Egalitarian and Fatalists factors correspond well with Dake's (1992) worldviews; although, as can be seen, both have had a further statement added to them. The Egalitarian factor, as well as containing the original three Egalitarian worldview statements, also contains the Individual worldview statement, *In a fair system, people with more ability should earn more*. It is easy to see why this statement might represent a negative measure of the Egalitarian who

dislikes inequality, even when it appears to have some justification. Likewise, the Fatalist factor contains the three original Fatalist worldview statements plus one other, this time from the Hierarchist worldview, *People in positions of authority tend to abuse their power*. Once again, it is not difficult to see how this statement could represent a positive measure of the Fatalist who feels that things are out of his or her control.

The third factor contains both of the remaining statements from the Hierarchist worldview, *We need to pull together and support the choices the government makes* and *Those in power often withhold information about things that are harmful to us*, and one of the two remaining statements from the Individualist worldview, *I admire those who attempt to be independent and self-sufficient by growing their own food*.

This new Hierarchist/individualist factor appears to tap, not only into a hierarchist view of the world, but also a judgement upon whether or not those at the top of the hierarchy are to be trusted and what the response to this might be.

The remaining statement from the original Individualist worldview, *Government has no right to regulate people's personal risk-taking activities*, such as mountain climbing, hang-gliding and so on, did not load onto any of the factors with sufficient strength. For this reason, this statement was omitted from the subsequent analysis of relationships.

Table 3.

Factor analysis results (only loadings above .4 are shown).

Statement	Original world-View	Factor 1 Egal.	Factor 2 Fatalist	Factor 3 Hier./ Ind.
If people were treated equally, society would have fewer problems.	Egal.	.75		
What this world needs is a more equal distribution of wealth.	Egal.	.73		
We have gone too far in pushing for equal rights.	Egal.	-.69		
In a fair system, people with more ability should earn more.	Ind.	-.59		
I feel that I have very little control over risks to my health.	Fatalist		.65	
It's no use worrying about public affairs; I can't do any thing about them anyway.	Fatalist		.63	
People can offset health risks from pollution by improving their individual lifestyles, for example by exercising and eating properly.	Fatalist		-.51	
People in positions of authority tend to abuse their power.	Hier.		.49	
I admire those who attempt to be independent and self-sufficient by growing their own food.	Ind.			.65
We need to pull together and support the choices the government makes.	Hier.			-.62
Those in power often withhold information about things that are harmful to us.	Hier.			-.60
Proportion of variance explained		18.77%	14.37%	12.22%
Cronbach's alpha coefficient		.70	.41	.32

2.3.2. Correlation: demographic attributes

Table 4 shows all of the notable correlation coefficients and their significances relating to demographic attributes. In keeping with the norms established in the studies reviewed in the introduction, correlations above 0.2, with significance greater than .05, are considered notable.

With respect to demographics, as Table 4 shows, notable correlations exist in three key areas relating to demographic attributes. Findings with respect to gender and liberal voting intention conform with the literature reviewed in the introduction. In addition, socio-economic status emerges as a third key factor.

The present study confirms that women appear to have a greater perception of environmental risk than men (Spearman's Rank Correlation coefficient $r = .36$, significance $P = .00$). Further, people who scored highly on the femininity scale also appear to have a greater perception of risk ($r = .24$, $P = .03$) and to have a lower perception of their ability to reduce environmental risk themselves ($r = -.29$, $P = .04$). Confirmation is also provided that people with liberal voting intentions appear to have a greater perception of risk ($r = .24$, $P = .04$).

Table 4 also contains indications that, in this instance, socio-economic characteristics might be more important in the determination of perception of environmental risk than previous studies have suggested. Results in the present study suggest that people who live in smaller properties, people with less education and, particularly, people with lower annual incomes all have greater perceptions of environmental risk ($r = -21$, $P = .05$; $r = -.23$, $P = .03$ and $r = -.44$, $P = .00$ respectively). A socio-economic index comprising property size, education and income shows strongly that people from lower socio-economic groups, thus defined, have greater perception of risk ($r = -.44$, $P = .00$). It is also worth noting that people who live in smaller properties appear to perceive less personal ability to reduce environmental risks to themselves ($r = .26$, $P = .01$).

One final point with respect to demographic characteristics: ethnicity does not appear to be associated with perception of environmental risk in this context; this may be a reflection of lesser ethnic segregation in the UK compared to the US.

Table 4.

Notable correlations of *Perception of environmental risk* and *Ability to reduce environmental risk* with demographic attributes.

	Perception of environmental risk		Ability to reduce environmental risk	
	r	sig.	*r*	sig.
Age (question 76)				
Gender				
Gender (question 77)	**.36**	**.00**		
Femininity scale (questions 66 - 75)	**.24**	**.03**	**-.29**	**.04**
Socio-economic characteristics				
Size of property (question 78)	**-.21**	**.05**	**.26**	**.01**
Tenure (question 80)				
Education (question 81)	**-.23**	**.03**		
Annual income (question 82)	**-.44**	**.00**		
Socio-economic index	**-.44**	**.00**		
Ethnicity (question 78)				
Liberal voting intention (question 83)	**.24**	**.04**		

2.3.2. Correlations: worldviews and other concepts

Turning to the worldviews and other attitudinal concepts, as Table 5 shows, the present study reinforces the impression created by the US literature, that greater perception of risk is associated with an egalitarian worldview ($r = .21$, $P = .05$). And, where Peters and Slovic's (1997) merged Fatalist/hierarchist worldview has an association with a lower perception of risk, so too does the merged Hierarchist/ individualist factor in the present study ($r = -.20$, $P = .06$).

Further concurrence with previous work is shown in the results relating to the relationship between perceptions of environmental risk and two of the attitudinal concepts described in the introduction. As Table 5 shows, three out of the four 'concerns about the regulatory system' statements show strong correlations between

perception of a lack of equity and fairness in the system and greater perception of environmental risk (Question (Q) 62: $r = .49$, Q63: $r = -.33$ and Q64: $r = .49$; all with $P = .00$). Similarly, three out of the seven 'trust in experts/government/science' statements suggest that a lesser degree of trust is associated with a greater perception of environmental risk (Q50: $r = -.22$, $P = .04$; Q55: $r = -.21$, $P = .05$; Q59: $r = -.33$, $P = .00$). However, the third of the three attitudinal concepts highlighted in the introduction, 'technological enthusiasm', did not show notable correlations with perception of environmental risk in this study.

With respect to the selected other risks featured in Section 2 of the questionnaire, the results shown in Table 5 suggest that people who have greater perception of environmental risk also have greater perceptions of other risks (Crime: $r = .30$, $P = .01$; Economic uncertainty: r -.31, $P = .01$; Terrorism: $r = .28$, $P = .01$). Whereas, based upon Dake and Wildavsky's (1990) comments, one might expect the Hierarchist/individualist worldview to correlate with greater perceptions of these risks, the current study does not suggest this. Indeed, the only notable correlation in this area suggests an association between a greater perception of economic risk and the Egalitarian worldview ($r = .25$, $P = .02$).

The original a*bility to reduce environmental risk* section yielded less voluble results than the earlier section. As Table 5 shows, perhaps not surprisingly, results suggest that the Fatalist worldview appears to be associated with a perception of less personal ability to reduce environmental risks ($r = -.21$, $P = .04$).

With respect to the three attitudinal concepts investigated, there is an indication that people who perceive a lesser ability to reduce environmental risk also feel that the regulatory system surrounding environmental risk is an unfair one, are more enthusiastic about technology, and are less trusting in experts/government/science. However, since all of these suggestions are based upon just one question each (Q65: $r = -.31$, $P = .01$; Q44: $r = -.31$, $P = .01$; and Q:50 $r = .26$, $P = .02$ respectively), the Ability to reduce environmental risk section is not discussed in the conclusions.

Table 5.

Notable correlations of *Perception of environmental risk* and *Ability to reduce environmental risk* with worldviews and other attitudinal concepts

	Perception Of environmental risk		Ability to reduce environmental risk	
	r	sig.	*r*	sig.
Worldviews				
Egalitarian	.21	.05		
Fatalist			-.21	.04
Hierarchist/individualist	-.20	.06		
Perception of selected other risks				
Crime	.30	.01		
Economic uncertainty	.31	.01		
Terrorism	.28	.01		
Concerns about equity and fairness of the regulatory system				
62. The public should be able to vote on issues of environmental risk.	.49	.00		
63. When the risk is very small, it is OK for society to impose risks on individuals without their consent.	-.33	.00		
64. People living near the source of a potential environmental risk, for example a waste disposal plant, should have the authority to close the plant if they think it is not being run properly.	.49	.00		
65. The process of approving plants that might have an environmental risk provides adequate opportunity for the public to have their concerns considered.			.21	.06
Equity and fairness of the regulatory system index	.59	.00		
Technological enthusiasm				
44. A high technology society is important for improving our health and well being.			-.31	.01
51. Technological development is destroying nature.				
Technological enthusiasm index				

Table 5 continued.

Notable correlations of *Perception of environmental risk* and *Ability to reduce environmental risk* with worldviews and other attitudinal concepts.

	Perception of environmental risk		Ability to reduce environmental risk	
	r	sig.	*r*	sig.
Trust in experts/government/science				
43. Experts are able to make accurate estimates of environmental risks.				
45. Differences of opinion about environmental risks can be resolved by scientific data and analysis				
50. If a scientific study produces evidence that a substance is harmful to humans, we can be sure that we will be told about it.	**-.22**	**.04**	**.26**	**.02**
52. Our government and industry can be trusted with making the proper decisions regarding managing environmental and technological risks.				
55. Decisions about health risks should be left to the experts.	**-.21**	**.05**		
56. Scientists are able to make accurate estimates about environmental and technological risks.				
59. Unless public health officials alert me, I don't really have to worry about environmental health problems.	**-.33**	**.00**		
Trust in experts/government/science index 1	**-.29**	**.01**	**.30**	**.01**

3.   Discussion

Having reported the results in the previous chapter, this chapter is interpretative in character. This paper opened with the contention that after modernity comes subjectivity, uncertainty, diversity...and risk; that with late-modernity comes disillusionment with science and technology, and the institutions of modernity. The results of this research appear to bear this out (see below); however, it was also proposed that in late-modern society class and gender might not be the orienting factors they once were. This research questions that assertion; both gender and socio-economic status emerged as significant predictors of perception of environmental risk. This suggests that late-modernists might be a little over keen to dismiss the importance of old certainties as contemporary determinants of attitudes and ways of viewing the world.

3.1.   Theoretical conclusions: real constructionism

The results described above appear to support the constructionist view that risk in general, and environmental risk in particular, are uncertain, varied and subjective phenomena. While not very surprising perhaps, it is worth restating that the present research suggests that some people perceive considerably greater environmental risk than do others. At the same time, results suggest that the level of trust that people have in the institutions that regulate environmental risk, and concern about the regulatory process itself, are also highly varied. Diversity of perception of environmental risk, and these other attitudinal concepts, appears to be constructed through demographic variations and through cultural orienting dispositions.

It can be concluded, therefore, that these results reinforce doubts about the risk professionals' notion that risk, including environmental risk, is real, singular and objective. This provides further emphasise of how unhelpful it is for risk professionals to dismiss citizens' concerns as irrational. At the same time, however, the research indicates that, for many people, environmental risk is of great concern. For these people, the idea that such risks are the uncertain and subjective products of the culture in which they live might appear as untrustworthy as the risk professionals' certainty. For such people, as for Ulrich Beck, environmental risk is all too real.

The implication of this apparent paradox is that Lash *et al.* (1996, p. 3) are right to champion new ways of thinking that can transcend the 'sterile reductionisms' of purely constructionist and realist approaches. This is by no means easy as the two modes of thought appear to contradict each other and emerge from quite distinct 'wormholes'; for example, Royal Society (1992) is so unnerved by this that it conspicuously keeps its treatment of the two approaches entirely separate.

However, a start has been made: Kasperson (1992, p. 158) defines risk as, 'in part an objective threat of harm to people and in part a product of culture and social experience.' I would now like to suggest two further foundational tenets for a more integrated way of thinking. First, such a new way of thinking need not reflect the two perspectives equally; second, a certain amount of fluidity in the extent to which each perspective is reflected, according to the debate at hand, should be permitted. For example, Hannigan's (1995, p. 187) constructionist approach to the environment may provide the most productive understanding of the power processes by which issues are 'assembled, presented and contested' as problems. As in the present research, one might utilise a constructionist approach to examine how and why people's perception of environmental risk varies. At the same time, one could adopt the more realist approach of Ulrich Beck in order to build a compelling position from which to advocate change to the power processes involved.

Some may interpret such theoretical fluidity as evading the issue, as a typical postmodern technique, or just as plain sloppy. However, it is my contention that, although theoretically contradictory, the constructionist and realist perspectives on risk and the environment could offer complementary practical benefits to society. Perhaps such integrated ways of thinking might offer risk professionals a context within which to acknowledge and engage with the concerns and knowledge of citizens in a way that Wynne would applaud. They may provide politicians the space to develop more citizen-centred regulatory approaches. They could offer opportunities for trust-building dialogue to replace contemporary trust-destroying conflict between risk professionals, scientists, experts, politicians and so on and the public, such as that between the EPA teams and citizens groups described by Hannigan. It could be that an integration of realist and constructionist approaches to the environment offers the best opportunity for society to come to grips with contemporary and future environmental problems. It is that what, for want of a better term, we might call *real*

constructionism, how these strategies might work and the problems that they would come up against should be the subject of further research.

3.2.   Political considerations

With these comments in mind, the research question that was identified earlier in this paper:

> What relationships exist between perceptions of environmental risk and demographic/socio-economic characteristics, worldviews, affect, trust in experts/government/science, concerns about equity and fairness in the regulatory system, and technological enthusiasm?,

can be answered as follows.

As described in the introduction, Flynn, Slovic and Mertz (1994) and others suggest that certain societal groups, usually women and disadvantaged 'racial' groups, have a greater perception of environmental risk because they are disadvantaged in society. At the same time, people with liberal political orientations appear to share this greater perception of environmental risk. In addition, Peters and Slovic (1996) and others suggest that greater perception of environmental risk is also associated with an Egalitarian worldview and with certain other attitudinal factors, including greater *concerns about equity and fairness in the regulatory system*, *technological enthusiasm* and less *trust in experts/government/science*.

Notwithstanding statistical objections that could be raised concerning the extent to which the present results can be considered to be representative, this research reinforces much of this picture. Demographically, both female gender and liberal political orientation emerge as predictors of greater perception of environmental risk. Further, this research also suggests a significant role for lower socio-economic status as a factor in the construction of greater environmental risk. Greater perception of environmental risk also appears to be associated with the Egalitarian worldview (and its associated *nature ephemeral* 'myth of nature'), less *trust in experts/government/ science* and, in particular, greater *concerns about equity and fairness in the regulatory system*.

Of these findings, perhaps the most significant is the emergence of socio-economic status, particularly income, as a predictor of perception of environmental

risk. This finding is important, first of all, because it emerges more strongly here than in previous studies. It is also important because it taps right into Flynn, Slovic and Mertz's (1994) conclusions about the importance of 'socio-political factors such as ... status' (p1101) and 'power' (p1107) in environmental risk perception. It is clear from this work that more detailed exploration of the dynamics of autonomy, status, trust, perceptions, attitudes and worldviews, among these groups would be of considerable value.

Of course, as a characterisation of the person who perceives more environmental risk emerges, so too does a picture of the person who perceives *less* environmental risk. This person is more likely to be male, to have a higher socio-economic status, and to have a more conservative political orientation. At the same time, this person is likely to perceive the world in more Hierarchical/individual terms (with an associated *nature benign/perverse/tolerant* 'myth of nature' than Egalitarian, to be satisfied with the regulatory system surrounding environmental risk, and to have greater trust in experts/government/science.

As Flynn, Slovic and Mertz (1994) and Davidson and Freudenburg (1996) before me, I find it easy to conjecture that these conservative, high socio-economic status men perceive less environmental risk because they have more power to shape society, are accorded greater status by society, and benefit more from society. It is also easy to imagine that they may well themselves be involved somehow in the development of regulations, whether as experts, senior managers, in government or Whitehall, or as scientists. Within these contexts, it is not surprising that these people are not unduly concerned by the regulatory system surrounding environmental risk and express greater levels of trust in experts/government/science.

3.3. A further 'myth of nature'?: nature commodity

The previous sections suggest that issues of power and status appear to be central to perceptions of environmental risk. Although such issues are reflected to some extent in the worldviews of cultural theory, the corresponding 'myths of nature' do not reflect this (see Table 1.1.). Cultural theory suggests that the Hierarchist/individualist worldview has a corresponding 'myth of nature' as benign and perverse/tolerant. Although it doesn't fit perfectly into the cultural theory typology, in the sense that it is difficult to represent it graphically with a ball and line (see Figure 1), I would like to

propose an alternative 'myth of nature' for this group that *does* take account of power and status: *nature commodity*. I propose that this 'myth of nature' contrasts with *nature benign*, in that it acknowledges that nature is not 'predictable, bountiful, robust, stable and forgiving' (Adams, 1995, p. 34). However, while it concurs with *nature perverse/tolerant* that there are 'limits' to nature (*ibid*), *nature commodity* differs from *nature perverse/tolerant* because it is accepting of transgressions of these limits. This is the case because the *nature commodity* 'myth of nature' expects that the environmental risks produced by such transgressions will be distributed among society according to power and status in much the same way as other commodities such as houses, cars, education or health care.

As well as incorporating the vital issues of power and status, the notion of *nature commodity* is compelling because it goes some way to explaining NIMBYist responses to environmental risk. However, this is just conjecture; clearly, more detailed research is need into the attitudes, perceptions, worldviews and 'myths of nature' of this powerful group.

In the meantime, other sections of society seem set to experience increases in their perceptions of environmental risk, and their disquiet and distrust about regulatory procedures and the institutions that design them. As Redclift (1994) and Benton (1997) point out, the contemporary neo-liberal approach favoured by more and more governments worldwide encourages both the transferral of regulatory responsibilities to the private sector and the adoption of highly competitive practices which mitigate against best practice. Benton (1997) identifies the BSE crisis as caused by just such pressures. Clearly, these trends, and the resulting shifts in public perception, need to be monitored closely over the coming years.

3.4.   Methodological considerations

Some readers may find my sympathy with the epistemological and ontological tenets of postmodernity, and with the constructionist approach to environmental risk, somewhat at odds with my use of the psychometric method that was used in the present research. I would have to say that I share their unease. I am concerned that this approach excessively imposes the researcher's preconceived ideas on the respondents. I fear that the theoretical bases and the practical intentions of the psychometric approach often veer too much towards the technical notion of risk (this

is in the sense that it often appears that the objective of the psychometric approach is to help risk professionals get their risk communication right, rather than to encourage risk professionals to engage with citizen concerns and to reassess the principles upon which they carry out their risk assessments and risk management). Perhaps most importantly, I feel that the use of researcher-led statements, scales, indices and statistical tools cannot hope to deal with the complexity of individual's risk constructions. Although I did not interact with my respondents face-to-face, I share Renn's (1992, p. 51) views on this:

> 'I found in many of my respondents much wisdom and curiosity, both of which were largely ignored by my research instruments. I was bound to my prestructured, standardized questionnaire and forced to use categories that my respondents felt inappropriately described their opinions and values. Remote from the actual fieldwork, the social scientists of the polling institute used the numerical data to draw conclusions about people's feelings and behaviour. Often these conclusions appeared superficial or inadequate, since I had been exposed to the social context in which the responses were given.'

So too did several of my respondents; the following comments were made in the space provided in the questionnaire:

> 'Replies to most questions don't go deep enough into personal opinion, answers therefore superficial.'

> 'These are answers given quickly. On reflection, answers might be different. Are you interested in first thoughts or reflected opinions?

> 'As always, many answers are actually much more complex and qualified than a simple tick can illustrate.'

Bearing these misgivings in mind, it seems necessary for me to explain why I utilised the psychometric approach in this research. This was done because almost all of the empirical work in this area has followed this approach. For this reason, I considered it essential that I familiarise myself with the approach before moving on to more ambitious work. That is, of course, to familiarise myself without being seduced by its obvious attractions; for over the past twenty years or so, this approach to the study of perceptions of environmental risk, and risk in general, has produced remarkably consistent, voluble and cogent results.

Notwithstanding this, it is for the reasons described earlier that it is suggested that the adoption of qualitative research methods will better serve future work that explores people's perception of environmental risk. As Robson (1993) indicates, qualitative work, most likely in-depth interviews or focus groups, is able to produce information that is highly detailed, contextual and insightful. Further, in the context of qualitative work, respondents will be able to fully elaborate on *their* motivations and constructions, rather than relying on the researcher to second guess what these might be. Such an approach would be particularly useful, utilising a highly purposeful sampling method, for investigating the perceptions, attitudes, worldviews and 'myths of nature' of 'extreme cases' (Creswell, 1998, p. 119). These might include the conservative, high socio-economic status men who perceive little environmental risk or other groups, possibly liberal, lower socio-economic status women who may have a much lower sense of autonomy and power in general and with respect to environmental risk.

Of course, this is not to suggest that a qualitative approach would not be without its own problems; quantitative work is, for example, doubtless more capable of capturing large scale trends and can lay greater claim to being representative of a general phenomenon. It is for this reason that it is suggested that the methodology for future research into perceptions of environmental risk should utilise 'hybrid or combined strategies' (Robson, 1993, p. 41) or 'triangulation techniques' (Creswell, 1994, p. 7), taking advantage of both qualitative and quantitative research methods.

3.5.   A research agenda

The issues discussed in the previous two sections provide a fascinating agenda for further research:

- Theoretical development of an integrated *real constructionist* approach to nature and to environmental risk.
- Investigation of how such an approach might lead to innovative, inclusive responses to conflicts surrounding environmental risk.
- Monitoring of the contribution of environmental issues to wider debates surrounding the future of modernity.

- Complementary empirical work examining:
    - dynamics of power, autonomy and status, trust, worldviews and 'myths of nature' (particularly *nature commodity*) among groups with both low and high perceptions of environmental risk.
    - diachronic study of changes over time in perceptions of environmental risk.
- Development of contextualised, information-rich, qualitative approaches to the study of perception of environmental risk.

Notes

1. The author can be contacted by e-mail at: k.burchell@lse.ac.uk or at kevin@impactfactory.demon.co.uk, or by telephone or fax on: +44 (0)181 488 6521 (please call before sending a fax).

2. Further examples of contested knowledge and perceptions produced by so-called 'marginal' groups are provided by feminists, such as Haraway (1994) and Scott (1994); Clifford (1994) writes from a non-white perspective, and Edelman (1994) from a non-heterosexual perspective.

3. This early work, summarised in Slovic (1992), examines the relationship between independent risk characteristic variables, such as familiarity, control, catastrophic potential, voluntariness of exposure, inequity, and perceived benefits, and dependent risk perception variables of a wide range of risks from trampolines to radioactive waste. This data was used to create so-called 'risk personality profiles' (*ibid* p. 121). This work suggests that greater perception of risk is associated with risk characteristics, such as low familiarity, low control, high catastrophic potential, low voluntariness of exposure, high inequity, and low perceived benefits.

4. Adeola (1994) conducted telephone interviews concerning hazardous waste and petrochemical facilities with 213 residents of Baton Rouge, Louisiana. Zimmerman (1993) analysed US national census data and hazardous waste facility locations. Both studies concluded that disadvantaged 'racial' groups are more likely to live near sources of environmental risk than whites. Such findings have given rise to the notion of *environmental racism* (see various works by Bullard in Adeola, 1994, p. 105).

5. Davidson and Freudenburg (1996) also found the hypothesis that 'health and safety are more salient to women than to men' (p. 323) to be compelling. Hypotheses found to be less compelling by this study are that 'men are likely to be more knowledgeable about risk-related issues' (p. 317), and that 'men are more likely than women to be concerned about economic issues [and that] higher levels of concern about economic issues will be associated with lower

levels of environmental concern' (p. 322). For descriptions of the debates surrounding gender and perceptions of environmental risk see the above mentioned paper and Slovic (1997), and for broader discussions of gender and the environment see Jackson (1994).

6. It will be noted that the statements in Box 4 represent both positive and negative measures of the concepts discussed earlier. Naturally, this has been taken into account in all of the analyses undertaken.

Bibliography

Adams, J. (1995), *Risk*, UCL Press, London.

Adeola, F. (1994), 'Environmental hazards, health, and racial inequity in hazardous waste distribution', *Environment and Behavior*, 26(1), pp. 99-126.

Baldassare, M. and Katz, C. (1992), 'The personal threat of environmental problems as predictor of environmental practices', *Environment and Behavior*, 24(5), pp. 602-616.

Barke, R. and Jenkins-Smith, H. (1993), 'Politics and scientific expertise: scientists, risk, and nuclear waste policy', *Risk Analysis*, 13(4), pp. 425-35.

Bassett, G., Jenkins-Smith, H. and Silva, C. (1996), 'On-site storage of high level nuclear waste: attitudes and perceptions of local residents', *Risk Analysis*, 16(3), pp. 309-319.

Beck, U. (1992), *Risk Society: toward a new modernity*, Sage, London.

Benton, T. (1994), 'Biology and social theory in the environmental debate', in Redclift, M. and Benton, T. (eds.), *Social theory and the global environment*, Routledge, London.

Benton, T. (1997), 'Beyond left and right? Ecological politics, capitalism and modernity', in Jacobs, M. (ed.), *Greening the millennium?: the new politics of the environment*, Chapter 2, pp. 34-46, Blackwell, Oxford.

Bryman, A. and Cramer, D. (1997), *Quantitative data analysis with SPSS for Windows*, Routledge, London.

Clifford, J. (1994), 'On ethnographic allegory', in Seidman, S. (ed*.), The postmodern turn: new perspectives on modern theory*, pp. 205-228, Cambridge University

Press, Cambridge.

Cohen, R., Montague, P., Nathanson, L. and Swerdlik, M. (1988), *Psychological testing: an introduction to tests and measurements*, Mayfield, California.

Creswell, J. (1994), *Research design: qualitative and quantitative approaches*, Sage, London.

Creswell, J. (1998), *Qualitative inquiry and research design: choosing among five traditions*, Sage, Thousand Oaks.

Dake, K. (1992), 'Myths of nature: culture and the social construction of risk', *Journal of Social Issues*, 48(4), pp. 21-37.

Davidson, D. and Freudenburg, W. (1996), 'Gender and environmental risk concerns: a review and analysis of available research', in *Environment and Behavior*, 28(3), pp. 302-339.

Department of the Environment, Transport and the Regions (1998), *Night restrictions at Heathrow, Gatwick and Stansted: a preliminary consultation*, DETR, London.

Douglas, M. and Wildavsky, A. (1982), *Risk and culture: an essay on the selection of technological and environmental dangers*, University of California Press, Berkeley and Los Angeles.

Edelman, L. (1994), 'The plague of discourse: politics, literary theory and AIDS', in Seidman, S. (ed.), *The postmodern turn: new perspectives on modern theory*, pp. 299-312, Cambridge University Press, Cambridge.

Ellis, R. and Thompson, F. (1997), 'Culture and the environment in the Pacific northwest', *American Political Science Review*, 91(4), pp. 885-897.

ESRU (1998), *Environment and Society Research Unit prospectus*, Department of

Geography, University College London, London.

Flynn, J., Slovic, P. and Mertz, C. (1993), 'Decidedly different: expert and public views of risks from a radioactive waste repository', in *Risk Analysis*, 13(6), pp. 643-648.

Flynn, J., Slovic, P. and Mertz, C. (1994), 'Gender, race and perception of environmental health risks', in *Risk Analysis*, 14(6), pp. 1101-1108.

Gandy, M. (1997), 'Postmodernism and environmentalism: complementary or contradictory discourses?', in Redclift, M. and Woodgate, G. *The international handbook of environmental sociology*, Chapter 9, pp. 150-157.

Gare, A. (1995), *Postmodernism and the environmental crisis*, Routledge, London.

Giddens, A. (1987), *Social theory and modern sociology*, Polity Press, Cambridge in association with Basil Blackwell, Oxford.

Giddens, A. (1990), *The consequences of modernity*, Polity Press, Cambridge.

Giddens, A. (1994), 'Living in a post-traditional society', in Beck, U., Giddens, A. and Lash, S., *Reflexive modernization: politics, tradition and aesthetics in the modern social order*, Chapter 2, pp. 56-109, Polity Press, Cambridge.

Gilbert, N. (1993), 'Research, theory and method', in Gilbert, N. (ed.), *Researching social life*, Chapter 2, pp. 18-31, Sage Publications, London.

Goldblatt, D. (1996), *Social theory and the environment*, Polity Press, Cambridge.

Golding, D. (1992), 'A social and programmatic history of risk research', in Krimsky, S. and Golding, D. (eds.), *Social theories of risk*, chapter 2, pp. 23-52, Praeger Publications, Westport.

Greenberg, M. and Schneider, D. (1995), 'Gender differences in risk perceptions:

effects differ in stressed vs. non-stressed environments', *Risk Analysis*, 15(4), pp. 503-511.

Greenberg, M. and Schneider, D. (1997), 'Neighborhood quality, environmental hazards, personality traits and resident actions', *Risk Analysis*, 17(2), pp. 169-175.

Hannigan, J. (1995), *Environmental sociology: a social constructionist perspective*, Routledge, London.

Haraway, D. (1994), 'A manifesto for cyborgs: science, technology, and socialist feminism in the 1980s', in Seidman, S. (ed.), *The postmodern turn: new perspectives on modern theory*, pp. 82-115, Cambridge University Press, Cambridge.

Haraway, D. (1996), *ModestWitness@SecondMillenium.FemaleManMeetsOncoMouse: feminism and technoscience*, Routledge, London.

Harrison, C. and Davies, G. (1998), *Lifestyles and the environment, Environment and sustainability desk study*, Environment and Society Research Unit, Department of Geography, University College London, London.

Hine, D., Summers, C., Prystupa, M. and McKenzie-Richer, A. (1997), 'Public opposition to a proposed nuclear waste repository in Canada: an investigation of cultural and economic effects', *Risk Analysis*, 17(3), pp. 293-302.

Irwin, A. (1997), 'Risk, the environment and environmental knowledges', in Redclift, M. and Woodgate, G., *The international handbook of environmental sociology*, Chapter 15, pp. 218-226.

Jackson, C. (1994), 'Gender analysis and environmentalisms', in Redclift, M. and Benton, T. (eds.), *Social theory and the global environment*, chapter 6, pp. 113-149, Routledge, London.

Jacobs, M. (1997), 'Environment', in Jacobs, M. (ed*.), Greening the millennium?: the new politics of the environment*, Introduction, pp. 1-17, Blackwell, Oxford.

Kasperson, R. (1992), 'The social amplification of risk: progress in developing an integrative framework', in Krimsky, S. and Golding, D. (eds.), *Social theories of risk*, Chapter 6, pp. 153-178, Praeger Publications, Westport.

Lash, S. and Wynne, B. (1992), 'Introduction', in Beck, U., *Risk Society: toward a new modernity*, Sage, London.

Lash, S., Szerszynski, B. and Wynne, B. (1996), 'Introduction: ecology, realism and the social sciences', in Lash, S., Szerszynski, B. and Wynne, B. (eds*.), Risk, environment and modernity: towards a new ecology*, pp. 1-26, Sage Publications, London.

Lyotard, J-F. (1994), 'The postmodern condition', in Seidman, S. (ed.), *The postmodern turn: new perspectives on modern theory*, pp. 27-38, Cambridge University Press, Cambridge, extracted from Lyotard, J-F. (1984), *The postmodern condition*, University of Minnesota Press, Minneapolis.

MacGregor, D., Slovic, P., Mason, R., Detweiler, J., Binney, S. and Dodd, B. (1994), 'Perceived risks of radioactive waste transport through Oregon: results of a statewide survey', *Risk Analysis*, 14(1), pp. 5-14.

Napton, M. and Day, F. (1992), 'Polluted neighborhoods in Texas: who lives there?', *Environment and Behavior*, 24(4), pp. 508-526.

Olsson, G. (1987), 'The social space of silence', *Society and Space*, 5, pp. 249-262.

O'Riordan, T. (1981), *Environmentalism*, Pion Ltd, London.

Palmer, C. (1996), 'Risk perception: an empirical study of the relationship between worldview and the risk construct', in *Risk Analysis*, 16(5), pp. 717-723.

Peters, E. and Slovic, P. (1996), 'The role of effect and worldview as orienting dispositions in the perception and acceptance of nuclear power', *Journal of Applied Social Psychology*, 26(16), pp. 1427-1453.

Raynor, S. (1992), 'Cultural theory and risk analysis', in Krimsky, S. and Golding, D. (eds.), *Social theories of risk*, chapter 4, pp. 83-116, Praeger Publications, Westport.

Redclift, M. (1994), 'Development and the environment: managing the contradictions?' in Sklair, L. (ed.), *Capitalism and development*, pp. 123-140, Routledge, London.

Renn, O. (1992), 'Concepts of risk: a classification', in Krimsky, S. and Golding, D. (eds.) *Social theories of risk*, chapter 3, pp. 51-79, Praeger Publications, Westport.

Renn, O., Burns, W., Kasperson, J., Kasperson, R. and Slovic, P. (1992), 'The social amplification of risk: theoretical foundations and empirical applications', *Journal of Social Issues*, 48(4), pp. 137-160.

Robson, C. (1993), *Real world research*, Blackwell Publishers Limited, Oxford.

Royal Society (1992), *Risk: analysis, perception and management*, Royal Society, London.

Rydin, Y. (1998), personal communication, Professor Yvonne Rydin, Department of Geography and Environment, London School of Economics.

Savage, I. (1993), 'Demographic influences on risk perceptions', *Risk Analysis*, 13(4), pp. 413-420.

Scott, J. (1994), 'Deconstructing equality-versus-difference: or, the uses of poststructuralist theory for feminism', in Seidman, S. (ed.), *The postmodern turn: new perspectives on modern theory*, pp. 282-298, Cambridge University

Press, Cambridge.

Schwarz, M. and Thompson, M. (1990*), Divided we stand: redefining politics, technology and social choice*, Harvester Wheatsheaf, Hemel Hempstead.

Seidman, S. (1994), 'Introduction', in Seidman, S. (ed.), *The postmodern turn: new perspectives on modern theory*, pp. 1-23, Cambridge University Press, Cambridge.

Sklair, L. (1994), 'Global sociology and global environmental change', in Redclift, M. and Benton, T. (eds.), *Social theory and the global environment*, Chapter 10, pp. 205-227, Routledge, London.

Slovic, P. (1992), 'Perception of risk: reflections on the psychometric paradigm', in Krimsky, S. and Golding, D. (eds.), *Social theories of risk*, chapter 5, pp. 117-152, Praeger Publications, Westport.

Slovic, P. (1993a), 'Perceived risk, trust and democracy', in *Risk analysis*, 13(6), pp. 675-682.

Slovic, P. (1993b), 'Perceptions of environmental hazards: psychological perspectives', in Gärling, T. and Golledge, R. (eds.), *Behavior and environment: psychological and geographical approaches*, chapter 9, pp. 223-248, Elsevier Science Publishers BV.

Slovic, P. (1997), 'Trust, emotion, sex, politics and science: surveying the risk assessment battlefield', in Bazerman, M., Messick, A., Tenbrunsel, A. and Wade-Benzoni, (eds.), *Environment, ethics and behavior*, chapter 12, The New Lexington Press, San Fransisco.

Stern, P., Dietz, T. and Kalof, L. (1993), 'Value orientations, gender, and environmental concern', *Environment and Behavior*, 25(3), pp. 322-348.

Thompson, M., Ellis, R. and Wildavsky, A. (1990), *Cultural theory*, Westview Press,

Boulder Co.

Vaughan, E. (1995), 'The socioeconomic context of exposure and response to environmental risk', *Environment and Behavior*, 27(4), pp. 454-489.

Wandsworth Borough Council (1997*), Heathrow Airport, Terminal Five public enquiry: statement of case*, Wandsworth Borough Council, London.

Wynne, B. (1992), 'Risk and social learning: reification to engagement', in Krimsky, S. and Golding, D. (eds.), *Social theories of risk*, chapter 12, pp. 275-297, Praeger Publications, Westport.

Wynne, B. (1996), 'May the sheep safely graze? A reflexive view of the expert-lay knowledge divide', in Lash, S., Szerszynski, B. and Wynne, B. (eds.), *Risk, environment and modernity: towards a new ecology*, Chapter 2, pp. 44-83, Sage Publications, London.

Zimmerman, R. (1993), 'Social equity and environmental risk', *Risk Analysis*, 13(6), pp. 649-665.