



Environment & Society



White Horse Press

Full citation:

Huxham, Mark and David Sumner, "Emotion, Science and Rationality: The Case of the Brent Spar."

Environmental Values 8, no. 3, (1999): 349-368.

<http://www.environmentandsociety.org/node/5779>

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Emotion, Science and Rationality: The Case of the *Brent Spar*

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ABSTRACT: In June 1995, a campaign by Greenpeace forced the multinational oil company Shell to cancel its planned disposal of a redundant oil installation in the Atlantic. The *Brent Spar* incident attracted massive publicity and was influential in changing government policy on marine disposal of waste. During and following their campaign, Greenpeace were criticised as emotive and irrational by Shell and academic scientists. This paper looks at the arguments used during the debate, using literature, interviews and questionnaires. We investigate the use of key environmental words and phrases and ask what is meant by rationality in this context. We discuss some of the lessons that should be learnt from the incident by policy makers and scientists.

KEYWORDS: *Brent Spar*, rationality, science, precaution, sustainability.

INTRODUCTION

In June 1995 Europe's biggest company made the most public and controversial U-turn in the history of environmental campaigning. The debate over the disposal of the redundant oil storage platform, the *Brent Spar*, generated huge coverage in the popular and scientific press, unprecedented for any 'single issue' environmental cause. Despite the widely varying, and often bitterly opposed, opinions, virtually all commentators were agreed that the *Brent Spar* incident was a 'milestone event': 'Decisions about sea disposal will never be the same again' (McIntyre, 1995). The evidence so far suggests that they were right. The *Brent Spar* affair continues to be invoked in the popular press as a watershed, and is merited as influencing major shifts in governmental policy (Grove-White, 1997; Wilkins, 1997; Cairns, 1998, Huxham, 1998) – not least the recent

commitment to land disposal for all redundant steel rigs from the North Sea (Brown, 1998).

The effective use of arresting images by Greenpeace during the campaign helped to ensure this prominence, and even led to complaints from some sections of the media that they had been manipulated by the campaigners. However, the resonance and impact of the campaign cannot be explained as merely a result of public relations expertise. Rather, the *Brent Spar* provided a potent symbol of a clash between competing world views, and a reminder of the uneasy but crucial role of science in environmental policy making. Both sides claimed that scientific considerations were central to their positions. However, Greenpeace publicly admitted scientific errors in their campaign material. Although cost was one of the four criteria used by Shell in making their original assessment of disposal options (AURIS, 1994), Shell maintained throughout that their preferred option of deep sea disposal of the *Spar* represented the best scientific solution, and that 'an emotive Greenpeace campaign gave it a symbolic significance beyond any rational, scientific calculation of its impact' (Shell UK, 1995). Most independent scientists commenting publicly since the event have concurred with this view. 'Shell Oil's decision not to sink a used oil-rig at sea is a needless dereliction of rationality' was the editorial opinion of the world's most influential scientific journal, *Nature* (Nature, 1995), which believed that the *Brent Spar* issue had 'again exposed the shallowness of Greenpeace's arguments on scientific issues'. The specialist journal, *Marine Pollution Bulletin*, took a similar stance: 'there can be little doubt that a rational balancing of the expected environmental effects favours deep sea disposal as the BPEO (Best Practical Environmental Option)'. (McIntyre, 1995)

This apparent conflict between rationality and emotion was not the only one dramatised by the *Spar* incident. Other binary oppositions identified by the media and in the literature produced by both sides are given in Table 1. In this paper we discuss the arguments used in the debate, and explore the science and ethics underlying these arguments. As Wittgenstein showed, the meanings of words can only be understood by looking at how they are used. The *Brent Spar* case provides an excellent study of the conflicting uses made of some words central to current environmental discussion, such as science, rationality, precaution and sustainability. We investigate the use and meanings of these terms in published material, and through qualitative interviews with eight of the leading protagonists in the debate. All interviews followed a semi-structured format (see Appendix 1), lasted between 20–45 minutes, were tape recorded and subsequently transcribed. Three of our interviewees work for or with Greenpeace (identified in the text with *GE*), two for or with Shell (identified with *SE*), and three are marine scientists employed in academic research (identified with *AR*). The Shell and Greenpeace interviewees all held senior positions and were involved in decision making over the *Brent Spar*. The academics are senior

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Greenpeace	Shell
Appeal to public opinion	Consultation with experts
Emphasis on ignorance	Emphasis on knowledge
Broad framing of the risk analysis, incorporating political and social factors (including 'second order' risks)	Narrow framing of the risk analysis, considering only measurable uncertainties ('first order' risks)
Broad symbolic and political goals	Narrow business goals, and task of complying with regulations
Emotion	Rationality
Openness	Secrecy
Suspicion of government and regulatory bodies	Trust in government and regulations

TABLE 1. Binary contrasts in the Brent Spar debate, as represented in the popular and specialist press

researchers who were/are prominent in the public and scientific debate following the *Spar* incident. Representative quotes taken from these transcripts are given in the text in italics. If deep sea disposal represents the best scientific option, and the Greenpeace position was based on emotion and poor science, then a scientific training should affect how individuals perceive the various disposal options. We use quantitative methods to examine this suggestion. We examine the implications of the *Spar* episode for future marine policy, and suggest what lessons can be learnt from it on the roles of science, rationality, emotion and consultation in the formulation of that policy.

THE IMPACTS OF DEEP SEA DISPOSAL

The controversy centers around different perceptions of the likely impacts of deep sea disposal of the *Spar*, and much of the original discussion concerned the immediate environmental and biological effects of the proposed disposal. But

what were these effects, and how important are they in the debate? The original impact assessment, produced for Shell by the consultancy AURIS (AURIS, 1994), predicted that the *Spar* would break-up upon hitting the sea bed. It would cause the smothering of organisms immediately beneath it and in the near vicinity, due to sediment disturbance. Subsequently the contaminants on board would leak or dissolve into the surrounding waters. The environmental effects of this were predicted to be minimal. Greenpeace challenged this prediction of negligible harm (Greenpeace, 1995) on two grounds. First, inadequate knowledge of the quantities of toxic materials on board the *Spar*. Second, scientific ignorance of possible effects of anthropogenic impacts on deep sea organisms and ecosystems.

Both these points were justifiable. A full, independent investigation of the material on the *Spar* had not been made before disposal. The inventory of material that had been made was based on limited sampling (AURIS, 1994). A full inventory of the contents of the *Spar* was only completed by Shell after the decision not to dump. On the second point, there is great ignorance over many of the salient biological and hydrological facts. The responses of virtually all deep-sea species to different pollutants are unknown. More generally, there is much dispute about the species richness of the sea bed. Evidence is mounting that the deep sea may be extraordinarily rich in species, possibly rivaling such terrestrial epitomes of diversity as tropical rain forests (Gage and Gordon, 1995). In short, the ecology of most deep sea organisms remains unstudied. In addition, scientific doubts have been raised over how appropriate the chosen disposal site was (NERC, 1996).

Despite this, the immediate environmental impacts of the disposal were not considered important by any of our respondents, even those associated with or sympathetic to Greenpeace. In the words of one scientist:

The sinking of the Brent Spar would have had no greater impact than the sinking of any ship at sea ... in fact, probably less. (AR)

This interpretation is shared by virtually all scientific commentators since the event. It is even possible that disposing of the *Brent Spar* would have enhanced species diversity in the vicinity of the dump site, by providing organic and inorganic nutrients for opportunistic species (Nisbet and Fowler, 1995)

What is clear is that the environmental impact would have been minute ... I haven't come across a single scientist who would disagree with that. (SE)

Asked what the impacts of the disposal would have been, two of the Greenpeace interviewees did not mention biological effects at all. A third stated:

There would have been some immediate but localised environmental impact. I don't think there would have been any immediate impact on human health from a single installation, but as I say, that was never the point. (GE)

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There is consensus, therefore, that the dispute was never really about the immediate environmental impacts of this one disposal, despite the impression created by much of the contemporaneous media coverage. So what was the point, as Greenpeace saw it?

BRENT SPAR AND THE PRECAUTIONARY PRINCIPLE

A central issue raised in Greenpeace publicity and by our Greenpeace interviewees was the danger that sea disposal of the *Brent Spar* would abrogate the Precautionary Principle, which forms the central policy tool in environmentalists' approach to dealing with pollution. The Precautionary Principle arose out of the *Vorsorgeprinzip* (*vorsorge* = foresight, or taking care) which was used by the German government to justify the implementation of vigorous policies to tackle acid rain, global warming and pollution of the North Sea in the mid- to late-1980s. The first time that this principle was dubbed 'precautionary' and acquired a wider currency appears to be in the Ministerial Declaration at the Second International Conference on the Protection of the North Sea in London, November 1987 (Gray, 1990):

[The ministers agree to] accept the principle of safeguarding the marine ecosystem of the North Sea by reducing polluting emissions of substances that are persistent, toxic and liable to bioaccumulate at source by the use of the best available technology and other appropriate measures. This applies especially when there is reason to assume that certain damage or harmful effects on the living resources of the sea are likely to be caused by such substances, even when there is no scientific evidence to prove a causal link between emissions and effects (the 'principle of precautionary action').

In 1990, a Conference of Ministers from 34 countries, organised by the Norwegian Government (intended as preparation for the Rio Conference in 1992) declared that:

In order to achieve sustainable development, policies must be based on the precautionary principle. Environmental measures must anticipate, prevent and attack the causes of environmental degradation. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. (quoted in Haigh, 1993)

In this declaration the precautionary principle is linked to sustainable development, and involves what may be difficult value judgments; for example, what degree of damage counts as 'serious' ?

In the same year, the British Government incorporated a statement of the precautionary principle in their White Paper *This Common Inheritance: Britain's Environmental Strategy*:

Where there are significant risks of damage to the environment, the Government will be prepared to take precautionary action to limit the use of potentially dangerous materials or the spread of potentially dangerous pollutants, even where scientific knowledge is not conclusive, if the balance of likely costs and benefits justifies it.

Note the important addition here of 'likely costs and benefits', introducing another set of difficult and potentially very contentious value judgments.

The application and interpretation of the precautionary principle in practical cases is therefore controversial. O'Riordan and Jordan (1995) point out that:

... precaution lacks a specific definition and, as yet, it cannot prescribe specific actions or solve the kind of moral, ethical and economic dilemmas which are part and parcel of the modern environmental condition ... to date, precaution provides few, if any operable guidelines for policy makers nor does it constitute a rigorous analytical schema ...

Jackson and Taylor (1992) have attempted a more rigorous definition of the precautionary principle:

Anthropogenic inputs into the environment of unnatural substances or of natural substances in unnaturally large quantities should be avoided as far as is ecologically sensible.

Ecologically sensible has the following prerequisites:

1. That preventing a release to one compartment of the environment will not cause environmental damage elsewhere;
2. Substances should be prioritized for action in relation to their liability to cause harm.

Jackson and Taylor discuss in more detail the meaning of *harm* and *significant*, acknowledging that they are 'terms which reflect subjective judgements'. Jackson and Taylor also point out the shift in the burden of proof implied by the precautionary principle: that is, the burden shifts to the proponent of the activity who must prove the absence of harm.

The first formulation of the precautionary principle in 1987 (quoted above), and much of the subsequent literature on it, is concerned with discharges to the marine environment; the principle is often contrasted with the assimilative capacity approach, in which discharges are permitted provided that 'acceptable' levels of the potential pollutants in the environment are not exceeded. Others have taken a more general view of the principle. For example, Earll (1992) says that:

From an environmental perspective it is certainly not just toxic chemicals but *all of man's activities* which pose a threat to the environment and which need to be covered by the precautionary principle ... the aim of an environmental policy should be to prevent serious, widespread, or long lasting damage to the environment ... the precautionary principle is not a scientific ethic. However, to exercise caution we need

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information, and science provides information. In commonsense terms if you have little information about potential risks you exercise more caution not less. [emphasis added]

The precautionary principle, then, can be and is interpreted in different ways, and it is not clear how it could be applied in the case of the *Brent Spar*. This confusion is reflected in the answers of our interviewees to the question: 'Do you believe that the Precautionary Principle should be applied to cases like the *Brent Spar*?'

Two of the Greenpeace spokesmen say unequivocally that the principle should be applied; the third admits that '*it's very hard to apply ... I do think the precautionary principle should be applied, but in practice it's quite hard to see what that would have meant ...*'. If the sinking of the *Spar* is treated as an isolated event (ignoring the question of precedent for the moment), it could be argued that the precautionary principle is not appropriate here; as one of our interviewees said, '*all of the best scientific assessments of the Brent Spar in particular suggested that there were no reasonable grounds for supposing that significant effect would occur*' (AR). More specifically, if we use the more rigorous form of the precautionary principle as given by Jackson and Taylor, it can be argued that the *Brent Spar* did *not* contain natural substances in 'unnaturally large quantities'. One of the scientists that we interviewed argued that the avoidance of sea dumping would not be ecologically sensible, since preventing sea dumping would inevitably damage the terrestrial environment. Arguably, and despite the ambiguities, the precautionary principle could be answered in this case '*because one can actually get very very close to the outcome of the impact*' by studying the impact of accidents at sea. As a Shell spokesman put it '*there are just too many analogues around like sunken ships to justify the precautionary principle*'.

In conclusion, it is possible to argue, as Greenpeace do, that sea disposal conflicts with the spirit of the Precautionary Principle. However, it is clear that the principle as currently worded in legislation would not forbid disposal of the *Spar*. Indeed, some interpretations, such as that by Jackson and Taylor, could be used in support of sea disposal.

THE BRENT SPAR AS PRECEDENT AND SYMBOL

'There was never any question that Brent Spar would set a precedent'
(Tim Eggar, UK Department of Trade and Industry, quoted in Greenpeace, 1997)

'Dumping the *Brent Spar* would create a precedent for dumping other contaminated structures in the sea and would undermine current international agreements'
(Greenpeace, 1995)

The significance of the *Spar* as a precedent is repeatedly stressed by Greenpeace, and is identified by most of our interviewees as the most important aspect of the campaign. In what ways could the deep sea disposal of the *Spar* be seen as a precedent, and what evidence is there that this would, in fact, have occurred? There are at least four relevant areas of industrial policy, listed in order of increasing generality:

- 1) Disposal of other oil storage vessels from the North Sea
- 2) Disposal of oil rigs at sea
- 3) Disposal of radioactive waste at sea
- 4) Disposal of all wastes at sea

Much of the evidence, outlined below, suggests that the *Spar* would indeed have acted as a precedent, at least at some of these levels:

- 1) Shell accepts that deep sea disposal was an option for some other North Sea installations:

it was wrong to suggest that it [the Brent Spar] would have been the first of 400 installations. It would be the first of more like 4 than 400, I would think. (SE)

Shell maintain that this option must be kept open for up to 50 deep sea installations in British waters:

The oil industry will be working hard to convince regulators that flexibility [over disposal options] must be retained. (Shell, 1995)

As the first of the North Sea, deep water installations to be disposed, the *Brent Spar* would indeed have set a precedent for other installations in this category.

- 2) The *Spar* could also have acted as a precedent for more than a few storage vessels. International legislation governing the abandonment of installations is often unclear. The first relevant legislation is Article 5 of the 1958 Geneva Convention of the Continental Shelf which states that 'any installations which are abandoned or disused must be entirely removed'. However, this unambiguous statement conflicts with the recommendations of the 1982 United Nations Law of the Sea Convention (UNCLOS) which provides that 'any installations or structures which are abandoned or disused shall be removed ... *taking into account any generally accepted international standards established ... by the competent international organization*' (emphasis added). There has been considerable discussion over what constitutes the competent international organisation. The Commission of the 1972 Oslo Convention on Ocean Dumping, signatories to the 1972 London Dumping Convention and the International Maritime Organization (IMO) Maritime Safety Committee have all considered abandonment as potentially within their competence (Kasoulides, 1989). Both the Oslo Commission and the IMO have adopted policy guidelines that encour-

age the removal of installations, but which allow for some exceptions of 'bulky wastes'.

There is thus a general presumption against sea disposal in the international legislation. The main UK legislation governing sea disposal is the 1985 Food and Environment Protection Act. This provides for the issuing of licenses, on a case-by-case basis, for sea disposal. In determining whether to issue a license for sea disposal of substances, the licensing authority is instructed to 'have regard to the practical availability of any alternative methods of dealing with them'.

Real life precedents are likely to play an important role in resolving the ambiguities in both international and national legislation. Legal interpretations of what structures constitute genuine exceptions, in the international context, and just how much regard should be given to 'alternative methods' under UK law, will depend at least partly on historical evidence.

The oil industry has been lobbying for many years to allow offshore disposal (Kasoulides, 1989). In response, and following the licensing of the Spar's disposal, the UK government was poised to relax the relevant guidelines (*Marine Pollution Bulletin*, 1995). This was probably politically impossible after the Greenpeace campaign. This, combined with the legal uncertainties and evidence in letters between Shell and the UK government (Greenpeace, 1997), suggests that the Spar could have set a precedent for many other installations.

This is a conclusion supported by most of our interviewees:

I'm sure Shell spending all that money on the preparatory stages for disposing of Brent Spar ... suggests it was viewed as a precedent. (AR)

3) Naturally occurring radioactive material, referred to as low specific activity (LSA) scale, accumulated in the Spar's storage tanks during use. This scale is only mildly radioactive: one estimate suggests that the total activity on the Spar is likely to be equivalent to that of the granite buildings in Union Street, Aberdeen (AURIS, 1994). However, the marine disposal of most radioactive substances, including low level radioactive waste, is subject to a ban imposed in 1993 by the Contracting Parties to the London Dumping Convention 1972. It is unclear whether the terms of this convention apply to naturally occurring substances. This was recognised as an important issue by the British government before it issued a license for the Spar's disposal:

One of the key issues still to be resolved is the presence of LSA and metallic compounds in the Spar and the implications this has for deep sea disposal. This is an issue that is likely to feature in the abandonment of other offshore installations in the future. (quoted in Greenpeace, 1997)

Shell have now decided to dispose of the scale at the Dounreay nuclear plant, arguing that it is not dangerous when wet, but can become so when dry (Hill and Meo, 1998). Once again, given the legal ambiguities, the Spar could have set a precedent for the future disposal of naturally occurring low level wastes.

4) All interviewees accepted that the *Brent Spar* issue was likely to have implications beyond the oil industry. In particular, it would make sea disposal of any kind of waste more difficult:

What it does mean is that I don't think anybody else is going to try to deposit anything in the North East Atlantic. Essentially there won't be any dumping of waste at sea.
(SE)

The *Brent Spar* became, and remains, a resonant political symbol against sea dumping in general. The implications of this are explored below.

THE RATIONALITY OF DISPOSAL AT SEA

The discussion so far suggests that the Greenpeace position cannot be legitimately based on the prevention of specific environmental effects or on the defense of currently accepted definitions of the Precautionary Principle. However, concerns over the role of the *Spar* as precedent appear sensible. The campaign was thus largely symbolic, in that it used the *Brent Spar* issue as an attack on a particular approach to waste management, rather than on the technical risk assessment issues of the individual case. Such use of symbols is widespread in political campaigning in a media age. Is it inconsistent with science and rationality? The two words are used as synonyms in much of the coverage, and are generally set in opposition to 'emotion'. Shell claim, for example:

The key point is that the pursuit of sustainable development will require the rational, science-based business approach to be working in concert with the values and emotional commitment of individuals – not in conflict, as was the case for the *Brent Spar*. (Shell, 1995)

However, to conflate rationality with science is to restrict its legitimate meanings. Schrader-Frechette and McCoy (1993), for example, argue that applied ecology should be informed by 'ethical rationality' as well as by 'scientific rationality'. They define scientific rationality as a process of using general scientific laws to predict the probable outcomes assuming different hypotheses. However, ecology is a science with few, if any, general predictive laws. Ecologists should therefore also consider ethical rationality, based, for example, on theories of rights, duties and ideals, when making decisions. In addition, a narrow scientific rationality cannot deal with indeterminacies embedded in pre-analytical assumptions (Wynne, 1992). For example a case-by-case approach to sea disposal, such as the production of BPEOs, cannot encompass uncertainties over cumulative effects or the likely consequences of setting legal precedents for disposal. It will also usually ignore the social context of those uncertainties; those who feel excluded from the decision making process will naturally have greater concerns over possible future developments. Such complex, socially

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mediated effects might be referred to as 'second order risks' (Wynne, 1992). They are largely inaccessible to scientific analysis, and yet are often entirely pertinent to any risk assessment. A rational, *non-scientific* case can clearly be made both for and against sea disposal. *Nature's* description of the Shell turnaround as a 'dereliction of rationality' thus implies a narrow scientism. As the Natural Environment Research Council panel which considered the case in detail stated: 'any decision to proceed ... involves social, economic, ethical and aesthetic considerations ... the technical assessments of environmental risk is only one factor, and not necessarily the most important one' (NERC, 1996).

Much of the technical discussion over risk assessment in the case of the *Spar*, especially as it was repeated in the media, served to obfuscate the underlying debate. From the Greenpeace perspective, the sinking of the *Spar* could legitimate and unleash 'a whole trajectory of further technical, moral and social commitments which could lead ... to unacceptable environmental damages' (Wynne, 1995). In contrast, the views of many scientific and industry commentators were reflected in a letter to *Nature* (Colles, 1995):

As a result of the misguided lobbying of emotional environmentalists such as Greenpeace, the use of the oceans as a waste depository has been denied to applied scientists competent to take decisions.

The view that the deep ocean provides legitimate and germane disposal sites for waste was made by three of our independent interviewees:

I can't think of a better place to put rubbish like that. No-one ever goes down there, it's basically of no use to anybody whatsoever, it's dark, it's cold and it's under very high pressure. (AR)

If waste needs to be disposed, why not use the oceans? This is the argument made explicitly by our interviewees, and in some of the Shell literature. As one scientist put it:

I think the Greenpeace campaign is centred around a dogma that the sea requires greater protection than any other sort of biome on earth. I don't buy into that. (AR)

However, this too seems to be under-estimating the scope and challenge of the environmental message, in particular as enunciated by Greenpeace. Our interviewees suggested that Greenpeace might focus on the sea for historical and political reasons – in particular, that the sea is a commons lacking in a local constituency to protect it. But this need not imply that more waste will be transferred to the land:

For me the key issue was: should we set a precedent, not just in terms of dumping or not dumping, but in terms of industrial responsibility for waste. If somebody is planning to spend £100 million on a new plant this year, are they going to spend £120 million to make it closed loop ... because they see that the trend is going to be increasingly against dumping and discharging? (GE)

The broad political agenda of Greenpeace, along with questions concerning its democratic legitimacy, lead to some of the most trenchant criticisms in the media and from our interviewees:

The avowed intention of Greenpeace is to shut down the oil and gas industry world-wide as quickly as possible. That is a totally untenable stance by an unelected pressure organisation. (SE)

One interpretation of the dispute would therefore contrast the narrow, instrumental concerns of a case-by-case approach, amenable to 'scientific rationality', expressed by Shell and their supporters with the broader, symbolic, political and 'emotional' concerns of Greenpeace. This would ignore the arguments quoted above in favour of using the sea for waste disposal. Shell argues that their approach to the *Spar* was consistent with, and important for, sustainable development: '[the Greenpeace campaign] has dealt a serious blow to the cause of sustainable development – a cause to which Shell UK is deeply committed' (Shell, 1995). Shell thus identify their position within an approach to environmental management at least as broad, and open to uncertainty, as that adopted by Greenpeace. For many years Greenpeace and other NGOs have targeted multinational companies because of their huge, and increasing, political influence. It has often been convenient for such companies to deny or down-play their political power; to present themselves as politically neutral bodies passively subject to national legislation. One important, and encouraging, development from the *Spar* case has been the open acknowledgement by Shell of their wider political role, and of the democratic dilemmas posed by this (Shell, 1998).

QUANTITATIVE RESULTS

Most polling evidence indicates that scientists in general command public confidence as decision makers. However, the level of trust depends on the professional affiliation of the scientist. Scientists 'working for environmental groups' command higher confidence than those in industry, with those working for government scoring the worst (MORI polls, 1993, 1995 and 1996, quoted in Rose, 1998). Shell performed the required scientific analysis of the disposal options, received public support for their decision from prominent government and academic scientists, and vigorously defended it on the basis that it was the best scientific, rational solution. Despite this high level of support from institutional science, 71% of the UK public thought that the Shell solution was wrong (MORI poll, quoted in Worcester, 1995). The company's early response to this was to suggest that 'the prime task ... is that of external communication ... We have to redouble our efforts to give the public at large a better understanding of what we are doing ...' (Shell, 1995). The implied problem is that of a lack of technical or scientific understanding by the public, leading to an 'emotional'

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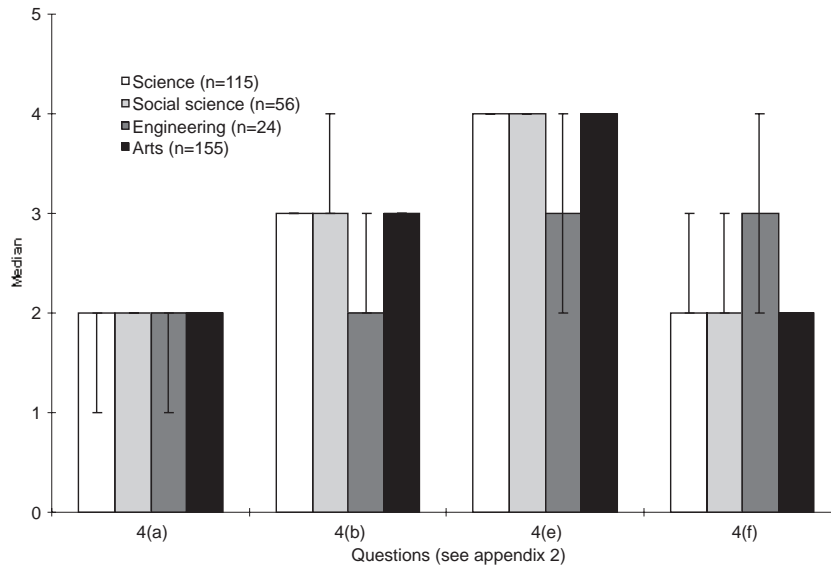


FIGURE 1. Student responses to four quantitative questions, $\pm 95\%$ non-parametric confidence intervals

support for Greenpeace. If this is true, increased understanding of, and training in, science should lead to more support for Shell's position. To investigate this, we conducted quantitative interviews in March and April 1997 with 350 third year students at Napier University, to assess the effects of a scientific training on value judgements over the *Spar* case. Each interviewee was given the same, brief, factual summary of the case, and asked to complete a short questionnaire (see Appendix 2). Students were grouped into four categories: science students (studying chemistry, biology or physics), social scientists (sociology and psychology), engineers and non-science students (arts, languages or law).

There was no clear difference in the responses of science and non-science students. In general, students supported Greenpeace's political stance, and favoured forbidding all waste disposal at sea (Fig. 1). However, the engineering students were an anomalous group, more likely to adopt a perspective closer to Shell's position (Fig. 1). These results support only speculative conclusions, due to the small sample sizes. However, there is no evidence here that a scientific training is likely to result in a greater sympathy for a 'scientific rationality' in this case. Interestingly, the data suggest that a training in engineering, rather than in science, is a more relevant factor, supporting the assumption that engineers

follow a 'techno-scientific' rationality in opposition to the more holistic rationality of the public (Rose, 1998: 56). Rather, in common with other surveys (Worcester, 1995), the students discriminate between different scientists on the basis of their affiliations. All groups of students rated independent scientists as the group they would most trust to make decisions relating to disposal of the *Spar* (in response to question 5, Appendix 2). Shell's problem, therefore, probably lay not in public misperception of the 'objective' issues, but in the perception of how the decisions about these issues were made.

BRENT SPAR AND PUBLIC CONSULTATION

Public support for the Greenpeace campaign may have been bolstered by a distrust of 'expertise', especially where there is suspicion that expert advice is partisan. This is illustrated by the quantitative work above; although scientists in general enjoyed the highest levels of trust, government scientists were viewed with suspicion. As O'Riordan (1996) puts it:

'Expertise' is becoming devalued ... [there is] a growing disillusionment that 'experts' can truly speak for the 'public good' ... traditional ways of comparing and judging the merits of many possible outcomes cannot be achieved by 'pure' rationality and logical analysis.

In return, the experts often distrust the public. With the exception of the Greenpeace representatives, all of our scientific interviewees expressed misgivings about involving a credulous public in decision making over the *Spar*:

to get the public involved is very dodgy because they can be manipulated so easily ...
(AR)

the general public's a fickle animal and individuals have very different views on the importance of things (SE)

I believe in democracy ... however, I think democracy only works if you have a reasonably well educated electorate ... Public opinion can be misled by a very successful campaign. (AR)

Despite this, there was a feeling that decisions such as what to do with the *Brent Spar* should not be left entirely to the experts; phrases such as 'the widest possible section of society ought to be involved', 'there needs to be more involvement of people' etc., occur regularly. In addition, some of the fiercest criticism of Greenpeace by our interviewees was based on the lack of any clear democratic mandate for the organisation; one scientist described Greenpeace as terrorists. The *Spar* episode thus forcefully illustrates the need in such cases for what O'Riordan (1996) refers to as 'civic science' (science which is open and accountable to the public), and for more sophisticated and inclusive public

involvement. How exactly the public can be involved is a complex problem, although the vital first step of allowing access to information is relatively easy. Some imaginative 'experiments in democracy' have been tried to engage members of the public in the political process, including 'citizen's juries' and 'consensus conferences'.¹ Shell themselves initiated a broad consultation process after the summer of 1995, termed the Brent Spar Dialogue, meeting with experts, NGOs and opinion formers in four countries, and using the Internet to publish information. The company recognized that wider consultation was needed because the *Spar* issue raised a series of value judgements:

Shell is responsible for Brent Spar, we're responsible for making the decisions but in taking that responsibility we will listen to the views and I would say the values of our stake holders because at the end of the day it's going to come down to some sort of value judgement. Science cannot produce the answer for us. (SE)

The *Spar* incident and controversy over Shell's role in Nigeria both provided impetus for a worldwide programme of consultation that Shell terms its 'Transformation' (Shell, 1998). This has led to the adoption of new environmental and social auditing systems, to be overseen by independent consultants (Shell, 1998). The company have made a commitment to expand and consolidate their consultation with stakeholders, and to publish the results (Shell, 1998). Inevitably, however, consultation on any single issue will be an expensive exception to normal industrial operation. As one of our interviewees said: 'you can't go out and have a referendum every time you want to try and put something in the sea.' Some form of democratic consultation is therefore needed at the policy, rather than the operational, stage. If a case-by-case approach is to be adopted, then it is this policy, rather than each instance of its operation, which requires public understanding and support. In the absence of this public consultation will still fail to engender trust. To quote O'Riordan again:

Judgement, based on honest and fair debate, is needed, and science lacks the mechanisms to do this. Cost-benefit analysis is becoming discredited for its distortion of 'true' values ... in an admirable review of the failure of regulatory consultative techniques to assuage local concerns over hazardous waste factors, Petts (1994) argues that reliable monitoring, open publication and rapid response to local concerns are not enough. *The waste industry has to show that it is limiting its own future by promoting the cause of waste minimization at source.* (emphasis added)

CONCLUSIONS

The notion of risk as combining both technical, first order issues, and socio-political, second order issues, is not novel (see for example Royal Society, 1992). Despite this, there is clearly little acknowledgment of the relevance of second order risk among many academic and business scientists. Much of the scientific

response to the *Spar* episode provides an excellent illustration of what John Adams has described as hierarchical rationality (Adams, 1995). Hierarchists believe in the interventionist management of nature, and see nature as robust and bountiful provided it is well managed. They rely on careful scientific research to establish the relevant facts for environmental legislation. In contrast, egalitarian rationality (as typified by Greenpeace) emphasises precaution and sees nature as fragile and precarious. Both these perspectives can be rational (although the former might be thought of as more scientific, as it relies heavily on the authority of scientific results). Both are also based on often unstated ethical and political judgements, but although Greenpeace and its allies emphasised the importance of these, the hierarchists often denied them altogether:

I don't think there were any moral or ethical issues there. I think it was quite a reasonable thing to do to suggest putting it into the deep water. (AR)

One of the binary contrasts in Table 1 opposes the broad perspective of Greenpeace with the narrower perspective of Shell. The discussion above shows this to be mistaken. The powerful resonance of the *Spar* arose because it was seen by most observers, including Greenpeace, Shell and the independent scientists we interviewed, as symbolic of a wider debate over waste management and the environment in general. The terms in which this debate is conducted are often ambiguous. Both sides could legitimately claim to be acting cautiously and in pursuit of sustainable development; the fact that these notions are so easily adapted to suit nearly all purposes illustrates how much work remains to be done in developing and clarifying these concepts. In particular, although Greenpeace felt that sea disposal would be against the spirit of the Precautionary Principle, current wording of the principle does not provide clear protection against cumulative impacts and second order risks. In addition, both sides claimed to be acting rationally. However, much of the criticism of Greenpeace seemed based on a refusal to allow that any discussion going beyond instrumental assessment could be rational.

As in all such cases, trust is central in determining how risk is perceived; a scientific training does not lead to support for a 'scientific' process if the arbiters of that process are not trusted, or if the process excludes relevant information. On the first point, the prerequisite for trust must be openness. Shell were criticised by the NERC committee (NERC, 1996) for excessive secrecy, which led to some fairly elementary scientific errors (such as the description of the North Feni Ridge site as one of low biodiversity) going uncorrected, and which bred suspicion. This is a mistake that can be relatively easily avoided in future. On the second, the *Spar* incident has revealed the BPEO process to be too narrowly construed; those involved in making major environmental decisions can no longer expect to justify them solely on the basis of a BPEO analysis. The assumption that opposition to sea dumping arose because of ignorance, made implicitly and explicitly by business and scientific commentators, reflects a

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misunderstanding of the social context of risk assessment. The resolution to environmental conflicts rarely lies in simply 'educating' the public. The 1998 Shell Report provides encouraging evidence that the company has moved beyond this position, and acknowledges that it plays a more complex role than merely following legislation. The social accounting and consultation procedures being established might provide useful examples for industry as a whole.

Although such attempts to address questions raised by the institutional framework of decision making will not always lead to consensus, they might at least allow a more honest and constructive debate. Should the terms of this debate be set by 'scientists competent to make decisions' (arguing for more research), national governments (in this case, in dispute with other governments), multinational companies (developing their own vision of the 'rational, scientific, business approach' to sustainable development) or 'terrorists' (as one scientist described Greenpeace)? This is a political question which deserves the widest possible discussion. By arrogating rationality to their own cause, the scientists who subscribe to *Nature's* view are attempting to close this debate before it has started.

NOTES

We would like to thank our interviewees for their openness and co-operation. We also thank Donald MacPherson and Craig Wilson, who were responsible for most of the quantitative data collection.

¹ 'Consensus conferences represent one among a number of recent responses to the perceived inadequacies of representative democracy. Together with 'citizen's juries', 'deliberative opinion polls' and other similar initiatives, they attempt to engage members of the public more closely in the political process. Such engagement is intended both to encourage habits of active citizenship and to improve the quality of public debate and decision-making'. From the preface to the UK National Consensus Conference on Plant Biotechnology, held in London on 2-4 November 1994, which was described as an 'experiment in democracy'.

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APPENDIX 1

Framework for semi-structured qualitative interviews. Prompts are shown listed after the main questions; they were used only when the interviewee did not respond with them spontaneously

1. What do you think the major impact would have been had Shell gone ahead and disposed of the Brent Spar in the N. Atlantic?

Impacts on:

- a) Human Health
- b) Environment
- c) Political
- d) Precedent

2. How important to you are the moral and ethical issues when considering the fate of the Brent Spar?

3. What is your opinion on each of the following quotes:-

a) 'If we allow the dumping of oil installations, we send a political signal that the sea may be used as a rubbish dump'. (New Scientist, 24/06/95)

b) 'An emotive Greenpeace campaign gave it a symbolic significance beyond any rational, scientific calculation of its impact'. (Shell, 1995)

4. Who should be involved in making decisions over the disposal of waste at sea?

For example:-

- a) Politicians
- b) Public
- c) Environmental groups
- d) Independent scientists
- e) Industry

5. Do you believe that the Precautionary Principle should be applied to cases like the Brent Spar?

6. What information needs to be known before disposal at sea is permitted?

7. What lessons can we learn from the Brent Spar when deciding how to dispose of any other oil rigs in the future?

APPENDIX 2. QUANTITATIVE SURVEY

Circle Box

- 1a. Gender: [M] or [F] b. Name of Course:

Circle Box

- 2a. Are you a member of any environmental groups? [Yes] [No]
 2b. If yes, which groups are you a member of?
 2c. What were your reasons for joining?
 2d. If no, what are your reasons for not joining?

Circle Box

- 3a. Do you know where the Brent Spar is now? [Yes] [No]
 3b. If yes, where is it

4. With reference to the key, please indicate how far you agree or disagree with the following statements:

Key: 1 = Strongly Agree; 2 = Moderately Agree; 3 = No Opinion
 4 = Moderately Disagree; 5 = Strongly Disagree

**Circle number
according to
the key**

- | | | | | | | |
|----|--|---|---|---|---|---|
| a. | 'If we allow the dumping of oil installations, we send a political signal that the sea may be used as a rubbish dump'.(New Scientist, 24/06/95) | 1 | 2 | 3 | 4 | 5 |
| b. | 'An emotional Greenpeace campaign gave it a symbolic significance beyond any rational, scientific calculation of its impact'. (Shell, 1995) | 1 | 2 | 3 | 4 | 5 |
| c. | The UK should be allowed to decide how to dispose of its own wastes, without the need for consultation with other governments. | 1 | 2 | 3 | 4 | 5 |
| d. | We should take action to avoid potentially damaging impacts on nature even when there is no scientific evidence to prove that those effects are harmful. | 1 | 2 | 3 | 4 | 5 |
| e. | Countries should be made to stop disposing of wastes at sea only after science has shown those wastes to be having a harmful impact | 1 | 2 | 3 | 4 | 5 |
| f. | The disposal of any waste in the sea should be forbidden | 1 | 2 | 3 | 4 | 5 |