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Is the British government's pragmatic approach to the precautionary principle in three environmental policy areas – OPs, GM crops and BSE – unprincipled or principled?

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This is an evaluation of the pragmatic way in which the British government makes use of the precautionary principle (PP) in its environmental policy decision-making. We focus on the question of whether the government's pragmatic approach to the PP is unprincipled or principled. We examine three cases in which scientific evidence played a central role – organophosphorous pesticides (OPs) in sheep dips; genetically-modified (GM) crops; and bovine spongiform encephalopathy (BSE: so-called 'mad cow' disease). These cases were chosen because they were particularly difficult to resolve scientifically, and gave rise to heated debates over the merits of the PP approach to environmental policy. The government's decisions were, respectively, to reject the PP in the case of OPs; to adopt a strong version of the PP in the case of GM crops; and to adopt a weak version of the PP in the case of BSE. Our evaluation is that these decisions were not unprincipled, but principled, in that they applied a consistent and coherent approach to the PP based on the ethical principle of 'circumstances'. We show how such an approach is justifiable, by drawing on the pragmatic political philosophy of Edmund Burke.

Keywords: precautionary principle; sound science; environmental policy; uncertainty; environmental risk.

Introduction

The British government, like other governments, relies heavily on scientific advisors in much of its policy decision-making. Having the authority and status of scientists to endorse its policies provides a government with probably the most important kind of support it could have. But rarely can scientific advisors provide a government with categorical evidence on difficult issues, because much of the relevant data is incomplete or inconclusive, and a significant degree of uncertainty is the norm rather than the exception. Where there is uncertainty, there are two alternative ways of proceeding: either 1) to wait until the evidence becomes conclusive that a problem does exist which requires governmental intervention (the sound science approach); or 2) to take immediate action in advance of conclusive evidence that there is a problem which requires governmental intervention, because if action is delayed until that evidence becomes available, it might be too late to prevent irreversible harm being done (the precautionary principle (PP) approach).

Before the advent of the PP in Germany in the 1970s (Jordan and O'Riordan 1995: 57), the traditional response of the British government in conditions of uncertainty was to apply the sound science approach (McCormick 1991). However, during the 1980s and 1990s, this attitude gradually changed as the government was increasingly obliged to take account of the PP. Britain is bound by numerous EU directives and regulations which inscribe the PP in its environmental and health policy-making, and as far back as 1990, the Government acknowledged precaution as one of five principles to guide its policies on the environment (DoE 1990: 34):

given the environmental risks, we must act responsibly and be prepared to take precautionary action where it is justified...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 (DoE 1990:11).

However, critics claim that, unlike Germany, which has wholeheartedly embraced the PP (Boehmer-Christiansen 1994: 55), Britain's embrace of it has been lukewarm, and that the British government only invokes the PP as a last resort, when it is strongly pressured by public opinion and/or the EU. The implication of this claim is that the British government is unprincipled or opportunistic in its approach to the PP, and that only when it embraces the PP as an ethical principle, will it achieve its professed goal of sustainable development:

the politics of precaution offer a profound critique of many of the ways in which the UK Government has managed its environmental affairs...Only when precaution tips the balance in favour of environmental well-being rather than material growth will the UK begin to make purposive steps in the direction of sustainable development (Jordan and O'Riordan 1995: 79-80).

In our view, such a charge is unconvincing, because it ignores the fact that the British government's pragmatic approach to the PP already conforms to an ethical principle – the principle of 'circumstance'. In 1790, Edmund Burke (1790: 384) enunciated the principle of circumstance in his statement that

Circumstances (which with some gentlemen pass for nothing) give in reality to every political principle its distinguishing colour and discriminating effect. The circumstances are what render every civil and political scheme beneficial or noxious to mankind.

What Burke means is that principles cannot be understood, let alone approved of, in abstraction or in a vacuum: they are practical guides to action. A principle that is only good in theory is, for Burke, a bad principle: a good principle is one that works in practice - indeed, practice is the *only* test of the worth of a principle. For example, for Burke (1790: 384), although the principle of liberty is good in the abstract, whether it is good in practice depends on what people do with it:

Abstractly speaking...liberty is good. [Yet] Is it because liberty in the abstract may be classed among the blessings of mankind, that I am...to congratulate a...murderer, who has broke prison, upon the recovery of his natural rights?...The effect of liberty to individuals is, that they may do what they please: we ought to see what it will please them to do before we risk congratulations, which may be soon turned into complaints.

Applying Burke's argument to the PP, we see that the principle of precaution, like the principle of liberty, may be good in theory, but it may not be good in practice – it all depends on the use to which it is put. This is a perfectly coherent and indeed, principled approach to environmental policy: circumstances will determine whether and how the PP is to be invoked and applied by the British government. The PP is one of a number of principles upon which the British government draws at various times to assist in its response to environmental issues, including the polluter pays principle; the principle of integrated pollution prevention control; the principle of proportionality, the principle of economic growth, and the principle of sound science. This is not an unprincipled approach to environmental policy: it is a meta-principled approach to make use of different principles when it judges them to be appropriate at different times and in different situations. Of particular relevance to the subject matter of this paper, is the way in which the UK government makes use of three such principles – sound science; weak PP; and strong PP – always choosing which one is most propitious for the issue at hand.

We test this argument - that the British government's approach to the PP is principled not unprincipled- by investigating British policy-making in three cases - organophosphorous pesticides (OPs) in sheep dips; genetically-modified (GM) crops; and bovine spongiform encephalopathy (BSE). These three case studies were chosen because they are significantly both similar and dissimilar. The similarities are threefold: first, they all impinge on human health; second, they all had periods of political salience; third, they all involve deep controversy over scientific evidence. The dissimilarities are fivefold: first, the OPs issue and the BSE issue have comparative long histories (over thirty years and 13 years respectively) whereas the GM issue is of comparatively recent origin. Second, the BSE affair is an example of a specific set of events which had a beginning and an end, unlike the OPs and GM issues, which continue to unfold. Third, the OPs and BSE issues affect a small number of known people, whereas the GM issue could potentially affect many, as well as the natural environment. Fourth, the damage done by OPs and BSE has already been inflicted, whereas the fears raised by GM crops relate largely to the future. Fifth, the OPs and BSE issues involved mainly one governmental department—the then Ministry of Agriculture, Food and Fisheries (MAFF) - whereas the GM issue, because it is linked to the biotechnology industry, involved several government departments and agencies, including the Department of Trade and Industry (DTI), the Department of Health (DoH), and the Office of Science and Technology. Therefore, the cases are sufficiently similar to raise common issues, but sufficiently dissimilar to yield general lessons.

The main method of obtaining data for the three cases was the study of official and non-official documents, including Parliamentary Select Committee reports, government departmental reports (for

example, DEFRA's GM Science Review Panel Report), and White Papers; scientific research reports from university departments; academic journal articles; and contemporary newspaper reports. This material was supplemented by 14 interviews, conducted with Members of Parliament; members of advisory committees; research scientists; and members of advocacy groups such as the OP Information Network and Green Alliance.

In what follows, section 2 explains in more detail the contrasting notions of sound science and the precautionary principle. Section 3 presents the results of the three case studies – OPs; GM crops; and BSE. Section 4 discusses these results to determine whether they reveal a principled or unprincipled approach to the PP. Section 5 is a conclusion, which summarises the paper's findings and their implications.

Sound science and the precautionary principle

Sound science

Although the term 'sound science' has not been adopted by the British government in official documentation, at the 1993 North Sea Interim Ministers Meeting, the then Minister for the Environment, Tim Yeo, referred to the need for decisions to be made on the basis of "sound science" (MacGarvin 1994: 74). The sound science approach to environmental and public health problems entails that policy-makers consult the appropriate scientific experts who search for causal links between a reported problem and the product or process allegedly causing the problem. Results are then reported back to government and decisions are based on the scientific recommendations. This approach assumes that unless a causal link exists between an activity, process, or product, and a harm can be scientifically demonstrated, then government will be right to refuse to take remedial action, because it could not justify public expenditure: 'Unless and until a cause-effect relationship is proven, scientific advice is, usually, to do nothing' (Carter and Lowe 2000: 182). Dryzek stated that the absence of conclusive scientific proof became the standard reason for the British government's inaction on such major environmental pollution issues as 'acid rain, carbon dioxide, chlorofluorocarbons, coastal pollution and sludge dumping in the North Sea' (Dryzek 1997 139). Moreover, the burden of proof of harm lay with the objectors to an activity, not with the persons engaged in the activity: objectors had to prove the producers guilty of harm; the producers did not have to prove their innocence.

Sound science is founded on positivist norms which Merton (1973) has characterised as the principles of objectivity, verifiability, disinterestedness (no subjective judgements or financial interests are involved), and scepticism (it waits until the facts are known before making judgements). In this approach, scientific 'methods are based primarily on deduction, experiments are replicable, theories are predictive, and the scientific endeavour is considered to be value-free' (Barrett and Raffensperger 1999: 110). Sound science is 'a powerful and neutral tool capable of predicting accurately risk and causality' (Christoforou 2003: 208). Wolpert (1997: 21) claimed that 'a key feature of science' is that 'there is only one correct explanation for any set of phenomenon'. Science, is therefore, 'deemed to be "expert" knowledge and scientists are the "experts"' (Barrett and Raffensperger 1999: 110), preventing non-scientists from challenging or reinterpreting claims labelled as "science" (Jasanoff 1990: 14).

Precautionary principle

However, the reputation of sound science was badly damaged by a series of well-publicised technological disasters during the 1970s and 1980s. Three Mile Island (1979), Bhopal (1984), Seveso (1976), Chernobyl (1987), and acid rain (1986) are all familiar examples of large-scale technological failures causing grave environmental degradation in recent years. According to Ulrich Beck, we are now living in a risk society: 'The once highly praised sources of wealth (the atom, chemistry, genetic technology and so on) are transformed into unpredictable sources of danger' (Beck 1992: 51). Despite the application of sound science, therefore, the increasing use of technology seems to produce a rapidly extending array of negative side effects.

One response to these shortcomings of sound science is the PP. Here the emphasis is on taking action against a threat to human health and/or the environment, even where the evidence of the threat is not conclusive, because by the time that evidence becomes available, it might be too late to stop the threat. Indeed, proponents of the PP believe that in many cases, the required evidence may never become available, and that we have to resign ourselves to accepting the limits of scientific knowledge, because we live in a world of permanent uncertainty. Nevertheless, advocates of the PP claim that it has scientific credentials. For instance, for Greenpeace it is a 'scientifically sound philosophy' (Johnston and Simmonds 1990: 402). For Christoforou (2003: 205) the precautionary approach 'provides both substantive and procedural rationality to the politics of risk regulation'. Saunders (2004) called the PP 'common sense'. For other commentators, the PP was more than simple common sense: it

was a moral principle, imposing an obligation on policy makers to take all necessary steps to protect human health and the natural environment. Moreover, the PP implied the reversal of the legal precept of “innocent until proven guilty”, since the onus of proof has shifted from the objector to prove that there is a threat of harm, to the producer to prove that there is not a threat.

Many commentators distinguish between two versions of the PP – a stronger and a weaker version. In its strongest formulation, preferred by ‘deep green’ NGOs and conservationists, the PP requires, first, absolute proof of safety before allowing new technologies to be adopted. Here the onus is placed on the polluters to prove *beyond all doubt* that his/her polluting activities will not damage the environment: that is, there has to be *certainty* that no harm will befall the environment if no intervention is made. Second, the strong version of the PP entails that whenever there is a perceived threat to humans or the environment, the perceived threatener must cease the threatening activity forthwith, irrespective of the socio- economic consequences. These features of the stronger version of the PP have led writers such as Sunstein to express some concern about the use of the PP (Sunstein 2005: 4). In theory, taking the PP to such an extreme could justify ruining an economy if that was the price that had to be paid to save a single endangered animal species.

By contrast, the weaker version of the PP, first, imposes a lesser evidential requirement on developers in proving that their activities do not harm humans or the environment (beyond *reasonable* doubt, rather than beyond *all* doubt); and second, allows evidence of negative socio-economic costs to be weighed against the positive environmental benefits of banning a harmful development. Such a weaker version of the precautionary principle was agreed in the Ministerial Declaration of the UN Conference on Environment and Development (the “Earth Summit”) in Rio de Janeiro: ‘Where there are threats of serious or irreversible damage, lack of scientific certainty shall not be used as a reason for postponing *cost-effective* measures to prevent environmental degradation’ (UNCED 1993, emphasis added). USCOP (2004: 36) described this as ‘a balanced precautionary approach, *applying judicious and responsible management practices*’ (emphasis in original). This is the idea of proportionality - that remedial measures should be tailored to a chosen level of protection. In this formulation, the focus is on the respective magnitudes of the threats and the responses: rather than simply saying there is uncertainty therefore we should not proceed, we are weighing up both the extent of that uncertainty and the impact of the consequent intervention (Christoforou 2003: 206). Of course, the weaker version of the PP leaves unanswered the questions of what is “reasonable doubt”; what are “cost-effective” measures; what are ‘judicious and responsible management practices’; and who should address these questions. Such questions highlight the indeterminacy of the PP, giving rise to critical judgements like that expressed by O’Riordan and Cameron (1994: 12, 21): ‘it is a rather shambolic concept, muddled in policy advice and subject to whims of international diplomacy and the unpredictable public mood over the true cost of sustainable living...there is neither an agreed yardstick, nor a consensus as to how it should be applied’. One of the PP’s conceptual conundrums, Whiteside (2006: 80) notes, has been pointed out by writers such as Cameron, Abouchar and Dupuy, who argue that the essence of the PP is its unconditionality, and so any attempt to dilute it by the notion of proportionality necessarily undermines it: ‘Proportionality...contradicts the very logic of precaution...What is a proportionate policy in relation to an unknown danger? Proportional to what? Doesn’t the proportionality of precautions depend entirely on whether catastrophic consequences occur – which is precisely what we do not know’.

The Three Case Studies: OPs; GM Crops; and BSE

In this section, we investigate whether the British government applied the sound science approach or the PP (either the weak PP or the strong PP) to three important policy problems in the area of public health and the environment. The first problem is organophosphorus pesticides in sheep dips.

OPs - organophosphorous pesticides in sheep dips

This case study considers the problem of dipping sheep with solutions containing organophosphorus pesticides (OPs), and the efforts of farmers and their representatives to get the government to accept that it causes serious health problems for anyone using these products. Those efforts proved unsuccessful, however, as the government adopted a sound science approach because of the lack of evidence that OPs in sheep dips caused ill-health in farmers.

Sheep are prone to skin parasites such as lice and sheep scab, and dipping is a practice designed to get rid of these parasites. OPs were introduced into sheep dip in the 1960s under various sheep scab orders, and farmers were expected to use a government-approved sheep dip (OPIN 1999). During the 1980s, about 40 million sheep on 18,765 farms were dipped once or twice a year (PAN UK, undated). Exposure of humans to OPs can be by absorption through the skin during handling the

concentrate; or when applying the diluted OP dip; or from inhalation of droplets if using a spraying method; or through oral exposure—by operators eating food after dipping without having washed their hands.

Farmers in the UK and their families have for many decades complained that sheep dip containing OPs has affected their health, causing headaches, flu-like symptoms, blurred vision, depression, exhaustion, short-term memory loss and confusion (Sigmund 2003). Campaigners estimated that in 1990 there were up to 2,500 farmers who could be suffering from the use of OPs in sheep dip (Walker 2001: 3). OP Information Network compiled a list of 800 victims of sheep dip, including 25 children of dippers who have learning difficulties and physical abnormalities (Brown 2000). At a seminar organized by the National Farmers Union and the British Medical Association on 2 June 1995, many farmers and doctors called for an immediate moratorium on OP dip and compensation for those whose health had been affected. An environmental journalist (Brown 2000) recorded that despite these and other reports that OPs were dangerous to health, the government refused to ban them.

Three regulatory committees - the Veterinary Products Committee (VCP); the Committee on the Safety of Medicines (CSM), and the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) - all advised the government that ill-health from prolonged low-level exposure to OP sheep dip remained unproven, so that on the basis of current knowledge no general withdrawal of OPs from the market was necessary, though they emphasised the need for further research. The government accepted the line argued by the Pesticides Safety Directorate that risk to humans can be minimised by following prescribed instructions (*Chemistry and Industry* 1996).

The government's response to the OPs problem was, therefore, sound science: because there was no firm evidence that properly conducted sheep dipping with OPs caused human ill-health, there was no justification for banning OP dips. All of the studies into exposure to sheep dip shared two important conclusions: 1) that there is a hazard attached to working with OP substances; but 2) that there is no definitive evidence of a causal link between OPs and ill-health. These are ideal conditions for the application of the PP, as an occupational and environmental health professional, Andrew Watterson (a Professor of Occupational Health) argued. He believed that the data reviewed by policy-makers had increased over the years; was of good quality; consistently suggested dangers in the use of OP sheep dip; and provided a compelling case for the application of the PP (quoted in Fairclough 2003: 436). But the British government did not agree, and stuck to its sound science approach, which it regarded as validated by its scientific advisors. After each piece of research on OPs was considered by government advisory bodies, they noted uncertainties in the evidence; questioned the methodologies used; and called for more research. Typically, COT used the sound science approach in looking at the chemical properties of OPs, accepting that they are toxic, but, finding no causal links, insisted that any problems could be avoided by the wearing of PPE as a preventive measure.

Fairclough sees a sinister side to the government's position, claiming that its scientific advisors have not been as disinterested as they ought to have been in conducting their evaluations of the evidence. For example, Fairclough (2003: 110) found that of the 21 members of the VCP in 1993/94, 'nine declared they had undertaken consultancy work for pharmaceutical companies and nearly half of the Committee declared that they had received some form of research funding from pharmaceutical companies'. Similarly, Watterson (2003) believed that there were indirect pressures from industry, pointing out that a number of members of advisory committees had share-holdings in chemical companies. Moreover, it has been suggested that toxicological evidence presented at meetings could have had their meanings changed after being interpreted and recorded by civil servants (Fairclough 2003:110). Fairclough (2003: 15) also pointed out that the evaluation and interpretation of scientific data and the details of decisions on approvals were not fully available to the public: her own attempts to access such information from the Advisory Committee on Pesticides met with continuous refusals. So the government operated as a closed policy community in which the licensing and information on OP dips remained in-house, and peer review was inclusive to government experts and industry experts (Fairclough 2003: 105). During interviews and informal meetings carried out during research for this paper, similar allegations to those made by Fairclough were heard.

In sum, on the OPs issue, the government maintained a sound science approach throughout, rejecting calls to adopt the PP. It based its sound science stance on the lack of conclusive scientific evidence of a causal link between OPs and human ill-health, and upon expert advice that proper usage of OPs would ensure the user's safety. As the then Minister of State for the Environment, Jeff Rooker, stated: 'If we are to ban or suspend use of OP sheep dip, I have to have a really good reason—one that is judge-proof, so some slick lawyer doesn't run around the corner and unstitch what we have done' (quoted in Mickle 1999). The message was that until there is proof that OP solutions are unsafe, they must be assumed to be safe. Yet that sound science stance was challenged by critics who argued that

the government's scientific advisors were neither neutral nor transparent in their evaluation of the evidence, and that safety instructions failed to take into account everyday human behaviour.

GM – genetically modified crops

A very different story emerges from the controversy over GM crops, where the government initially adopted a sound science stance, but was forced by public opinion and the EU to implement the strong version of the PP. Unlike earlier crop breeding techniques, GM engineering allows transfer of heritable traits between species. Despite the enthusiasm of biotechnology companies, government and many scientists, it has run into serious public relations problems, because many NGOs and consumers believe it is not safe. UK supermarkets refused to stock any foodstuffs containing GM ingredients, and in 1998, the EU Commission imposed a *de facto* moratorium on new approvals of GM products (Lieberman and Gray 2006). In response to these pressures, the UK government delayed commercial development of GM food and crops pending a series of field trials.

There is little doubt that the government's preferred approach on this issue was sound science as no hazard had been observed in early US research. The government was well-disposed to GM crops because the global trade in biotechnology-related products was vast. The market within the EU alone was expected to be worth \$100 billion by 2005 (*Guardian* 2002), and biotechnology companies in the UK employ around 20,000 people, contributing approximately £2 billion to the British economy, while worldwide, there are about 35 million hectares of land producing commercial GM crops. The government was, therefore, naturally keen to see the British biotechnology industry retain its lead in Europe.

However, a major concern of environmental NGOs and consumer organizations was the anxiety that genetic modification of crops to make them insect-resistant might result in such traits escaping into the wild and endangering biodiversity—the geneflow problem. It was also feared that herbicide resistance would find its way into weed populations, which would then outcompete food crops. In addition, there were worries of direct harm to human health: the general public in Britain and Europe had been fed stories for several years by the media of Mad Cow Disease, salmonella in chicken, *listeria* in cheese and *e-coli* poisoning, and in such a climate, it was hardly surprising that news of GM or “Frankenstein” food development raised further safety concerns about food. In addition, there was public unease about the idea of scientists meddling with nature. The unpopularity of GMOs with the public was also due to the predatory actions of biotechnology companies. The environmental journalist George Monbiot (2000: 253) claimed that by patenting genes, seeds and associated technologies, the biotechnology companies have “placed a padlock” on the food chain and could exercise complete control over what we eat.

A number of organizations, including English Nature, the Royal Society for the Protection of Birds, Friends of the Earth, and Gene Watch called for a moratorium on the growing of GMOs for a period of up to five years. The government's response was to establish a Cabinet Committee to deal with biotechnology matters, and in collaboration with the biotechnology industries concerned, to halt the commercial growing of herbicide resistant GM crops until scientifically-controlled field trials – “Farm Scale Evaluations” (FSE) scheduled to take place over four years - had been completed. Also, the government announced in 2002 that there would be a “Public Debate” on GM issues, consisting of three strands: 1) a science review; an economic review; and 3) a public consultation exercise called “GM Nation”, which involved nine foundation workshops each with 20 randomly chosen people to identify the issues for future public debate, followed by a series of public deliberative events where participants discussed the issues in small groups and reported back to plenary sessions. All participants in the events would be asked to return feedback questionnaires.

The results of the FSE were that two of the three GM crops grown in the trials, oilseed rape and sugar beet, appeared to be more harmful to the environment than were conventional crops, and should not be grown in the UK, but that the third crop, GM maize, allowed the survival of more weeds and insects than did non-GM maize, and might be recommended for approval, though some scientists still had reservations (Royal Society 2003). The Advisory Committee on Releases to the Environment, the main source of scientific advice for the regulation of GMOs, accepted the FSE report's conclusions (ACRE 2004). However, the Environmental Audit Committee of the House of Commons questioned the reliability of the FSE's findings, complaining that the maize trials were invalid because they applied the chemical atrazine, which was being phased out (House of Commons 2004: 1). Also, the committee questioned whether the GM industry had covertly influenced the results. Environmental NGOs pointed out that GM crops in the trials were only grown for one season in any one field, so incremental impacts of repeated growing could not be detected (Mayer 1999), and the issues of geneflow from GM crops to non-GM or organic crops and native flora, and the possible creation of “superweeds” and “superpests”, could not be resolved.

The results of the government's Public Debate provided little comfort for the GM crop cause. The science panel's review report found no scientific case for ruling out GM crops, but nor did it give them blanket approval, and after admitting gaps in its knowledge, it concluded that products submitted for approval need to be considered on a case-by-case basis (DTI 2003). The economic review report concluded that while GM crops could offer some benefits to farmers, any economic benefit to the UK was limited because of the narrow range of crops currently suited to UK conditions. The report on the public debate concluded that the public was unhappy about GM products, and that the more they knew about GM issues, the more their attitude hardened as they became more anxious about the risks involved.

To summarise the government's handling of the GM crop controversy, in early attempts to regulate GM products, the Government approached the introduction of these untried technologies by accepting the conventional risk assessment procedures familiar in the sound science approach. But increasingly, this policy became the target of vociferous campaigns by the green lobby and some of the media, urging a GM-free Britain. Also, the EU Commission imposed a moratorium on GM crops and foods. These pressures led the government to delay commercialization pending clarification of potential harm and product safety – in other words, to adopt a strong PP position. The response of the government to the issue of GM crops was thus different from its response to the issue of OPs, where it held on to its sound science approach. The main reasons for the difference were twofold: first, unlike the OPs issue, the GM issue gained high political salience very quickly and was the subject of much media attention; second, unlike the OPs issue, the GM issue required a decision urgently, because of the need to clarify whether the biotech industry could be allowed to grow GM crops.

Bovine spongiform encephalopathy

Unlike the previous two case studies, which are on-going policy problems, BSE was a problem that had a clear beginning (1985, when BSE first began to appear in herds in Britain) and a clear end (1998, when the EU Commission allowed the resumption of exports of British beef). The BSE crisis led to what is generally viewed as a policy disaster, and an example of how sound science was mismanaged by ministers and officials in vainly attempting to regulate a new hazard: 'This was a classic example of 'no evidence of harm' being misinterpreted as "evidence of no harm"' (Harremoes, *et al* 2002: 191). At first, MAFF refused to adopt a precautionary stance, relying instead on sound science to provide evidence with which to make decisions, though interpreting that evidence to suit the political priorities of the government. But later the pressure for action became so strong that the government had little choice but to take (weak) precautionary action. The BSE issue had major repercussions in both domestic and EU politics, including the collapse of the British beef market, the mass slaughter of infected cattle, the banning of British beef exports to the EU by the Commission, a diplomatic crisis when Britain began a retaliatory policy of non-cooperation designed to paralyze EU business, and a lasting legacy of public distrust of government's use of science.

BSE is one of a group of neurological diseases known as transmissible spongiform encephalopathy's (TSEs), which also include scrapie in sheep, and Creutzfeldt-Jacob Disease (CJD) and kuru in humans. CJD normally occurs in only one case in two million persons per year throughout the world (Oldstone 1998: 165), and mostly strikes people over 65. Because of the randomness of where in the world it appears, and because of its unknown origin, it is called sporadic CJD. The symptoms of TSEs were found in cattle in the UK in 1985, and after research conducted by the Central Veterinary Laboratory of MAFF, it was confirmed in November 1986 that a new strain, BSE, did exist. Within two years, over 2,000 cases of BSE in cattle emerged in more than 200 herds (Oldstone 1998: 163). The first account of this epidemic appeared in the journal *Veterinary Record* in October 1987 (Wells *et al* 1987). Much later, in March 1996, the government's new advisory committee on BSE, the Spongiform Encephalopathies Advisory Committee (SEAC), informed the Secretary of State for Health, Stephen Dorrell, of their latest findings: that a distinct variant of CJD had occurred in ten people in Britain over the previous 14 months and that a link between BSE and CJD could not be ruled out. Mr Dorrell immediately told the House of Commons about these findings, and a month later, the medical journal *Lancet* published a report of ten cases of a new variant of CJD in Britain. The unusual feature of these cases was that the patients' ages ranged from nineteen to thirty-nine, and the brain-wave pathologies of these patients were found to be different from other patients with sporadic CJD. The CJD Surveillance Units decided that Britain had a new variant CJD: vCJD (Oldstone 1998: 166). Since 1990, 170 people have died in the UK from vCJD.

For almost 10 years, the British Government and its scientific advisers insisted there was no risk from BSE to human health, or that any risk was so small that it could be said that there was no risk (Powell and Leiss 1997: 4). All that the government was prepared to do in the early stages of the problem was to take steps to control the spread of BSE in cattle; to encourage research into the possible

link with human health; and to set up committees to examine the evidence for such a link. However, in the face of the growing epidemic in cattle which was increasingly being reported in the media, senior officials at MAFF were concerned that difficult questions about its potential impact on human health would sooner or later be asked in Parliament, and that if some action was not taken by government they might be held responsible if it later emerged that BSE was transmissible to humans (Phillips *et al* 2000, volume 3, paragraph 5.41c).

Accordingly, acting on the advice of the Southwood Committee's 1988 report, the government introduced measures to make BSE a notifiable human disease; to slaughter affected cattle; to ban ruminant-derived meat and bone meal, and to provide compensation, which was set at 50% of the value of each confirmed case. In 1989, a ban was imposed on specified bovine offals, which included brains, spinal cord and other organs) in the human food chain, and in 1990, full compensation payments were authorised for farmers. In 1995, accepting the advice of SEAC, the government announced its decision to stop the use of bovine vertebral column in the manufacture of mechanically recovered meat. In 1996, the 30-month Slaughter Scheme was introduced, whereby all cattle over 30-months at the time of slaughter did not enter either the human or animal food chains. These measures were, according to one commentary, 'not designed to eradicate the BSE agent, but only to diminish the risk', and they were not introduced earlier, 'not because of their immediate costs, but because of their liability to undermine the government's reassurance message' (Van Zwanenberg and Millstone 2002: 175; 177).

However, the government was accused of dividing the scientific community into an in-group and an out-group, and favouring the former group over the latter group, which it marginalised. Richard Lacey, who had experience of serving on the MAFF Veterinary Products Committee and had been a consultant to the WHO since 1984, was convinced from the beginning that BSE could be passed on to humans, but after appearing before the House of Commons Select Committee on Agriculture, his evidence was dismissed as being 'sensationalist'; having 'lost touch with the real world'; and a mixture of 'science and science fiction' (Rowell 2003: 42). As the Phillips report pointed out,

The official line that the risk of transmissibility [of BSE] was remote and that beef was safe did not recognize the possible validity of any other view. Dissident scientists tended to be treated with derision, and driven into the arms of the media and to exaggerated statements of risk. Thus views expressed on risk became polarised. Dispute replaced debate (Phillips *et al* 2000, volume 1: 234).

Membership of the government's advisory committees reflected and perpetuated this division, in that successive BSE committees were staffed by 'respectable scientists', while those scientists who held more radical views were excluded. Steven Dealler (1996: 35), an independent research scientist, claimed that 'direct information about BSE was not reaching the medical literature and that what we were hearing was what MAFF was allowing us to hear'.

Van Zwanenberg and Millstone (2002: 174) claimed that 'the government's policy was not precautionary: its primary objective was rather one of trying to diminish, as far as possible, the short-term adverse impact of BSE on the profitability of the food industry and the level of public expenditure'. However, our view is that in taking the above measures, the government's measures had all the hallmarks of a weak PP – i.e. not banning the consumption of beef (which would have been a strong PP policy), but taking steps to reduce the risk of BSE spreading more widely, and contaminating human food.

Discussion

The government's position was different in each of the three cases: a sound science stance on the OP issue; a strong PP stance on the GM crop issue; and a weak PP on the BSE issue. For some commentators, the cases would confirm their judgement that the British government's preferred and default position is always the sound science stance; that it is inherently hostile to the PP; and that it is drawn reluctantly down the path of the PP (and preferably the weak PP rather than the strong PP) only when subjected to overwhelming pressure from public opinion or the EU. Our view, however, is that the British government is not hostile to the PP in principle, though neither is it committed to it in principle. Rather it regards the PP as one of several relevant principles to be taken into account when dealing with difficult environmental issues. As Jordan and O'Riordan (1995: 71) put it, 'precaution is now one of a number of principles which the UK government identifies as the foundations for its environmental policy'. Analysis of the circumstances in a particular case will determine how heavily weighted the PP is in the government's mind.

On the issue of OPs, the circumstances of the case were that the necessary precautionary steps should be taken by users of OPs, not by the government; that relatively few people were exposed to risk; that to ban OPs would lead to the use of other substances for sheep dipping which could seriously harm water quality in rivers; and that the issue had only intermittently high political salience. Accordingly, a sound science response was more appropriate than a PP approach (either weak or strong). On the issue of GM crops, the circumstances of the case were that although GM technology was extremely important for the British economy, GM crops potentially affected human health and the natural environment on a massive scale; that there were overwhelming pressures from environmental groups, the public, and the EU for a ban on the commercialisation of GM crops; that such a ban would not create significant hardship for consumers in the short term; and that sound science investigations would take a considerable time to complete. Accordingly, a strong PP was more appropriate than either a weak PP or a sound science approach. On the issue of BSE, the circumstances of the case were that, as the link between BSE and CJD/vCJD gradually became evident through sound science research, and as pressure mounted from other countries' boycotts of UK beef exports, the government took successive, if limited, precautionary steps to reduce the level of public exposure to the risk of contracting the illness. It judged that a weak PP was more appropriate than either a strong PP or a sound science approach. Some commentators argue that the Conservative government's comparatively weak PP approach to the BSE issue had sectional causes, in its close relationship with the farming industry (Grant 1997: 343; Cannon 1987: 395), and ideological causes, because it 'was ideologically committed to deregulation' (Bartlett 1999: 237). But if so, such causes were only two factors among many other considerations that the government had to balance.

In short, our finding is that the British government's approach to the PP is not, as is often portrayed, innate suspicion and automatic opposition, but that the PP offers one response (or rather two, a weak and a strong response) among several other alternative responses to the issues of environmental policy, which it will consider when assessing all the circumstances of particular cases. Such a finding not only contradicts a caricature of British environmental policy, but it also shows how the British approach is much more in line with other countries' approaches. Let us explain. Another caricature is the contrast that is often drawn between the EU as a proponent of the PP, and the USA as an opponent of it. Sunstein (2005: 13-14) rehearses this caricature as follows:

it has become standard to say that with respect to risks Europe and the United States can be distinguished along a single axis: Europe accepts the precautionary principle and the US does not. On this view, Europeans attempt to build a 'margin of safety' into public decisions, taking care to protect citizens against risks that cannot be established with certainty. By contrast, Americans are reluctant to take precautions, requiring clear evidence of harm in order to justify regulation (cf. König 2000: 126, 131; Whiteside 2006: 61; Graham and Hsia 2002: 373).

But as Wiener and Rogers (2002: 317, 335, 342) point out:

Sometimes the EU is more precautionary than the US (such as regarding hormones in beef), while sometimes the US is more precautionary than the EU (such as regarding mad cow disease in blood). Thus neither the EU nor the US can claim to be categorically 'more precautionary' than the other. The real pattern is complex and risk-specific...differences in relative precaution depend more on the context of the particular risk than on broad differences in national regulatory regimes...Neither the US nor the EU has taken a consistent position about its own stance. Each has been sometimes precautionary, sometimes not...Each actor has been more precautionary than the other as to some risks and less precautionary as to others (cf. Sunstein 2005: 14, 20, 29, 33-34; Whiteside 2006: 61-70).

The truth is that the US makes use of the PP in certain circumstances, and the EU declines to use it in certain circumstances. Indeed, as Sunstein (2005: 21, 34) notes, 'Every nation is precautionary about some risks but not others...Simply as a logical matter, societies, like individuals, cannot be highly precautionary with respect to all risks. Each society and each person must select certain risks for special attention...the selectivity of precautions is not merely an empirical fact; it is a conceptual inevitability'. This selective approach is exactly the same as that adopted by the UK – its employment of the PP is entirely issue-specific – circumstances determine if and how it deploys the PP in any given case.

If this discussion of the British government's use of the PP appears to be over-sympathetic to the government, we do have one critical observation – that in all three cases, there was a lack of

transparency on the part of the government, which seemed more concerned to reassure the public than to share its information. For instance, in the OPs case, repeated assurances were given that if farmers used OP sheep dip in accordance with the manufacturers' instructions, they should be safe from harm; yet not all the relevant data was made public by the government, and the peer review system was exclusive to the government and industry. In the case of GM crops, dissident scientists were effectively gagged, and membership of the government's advisory committees was skewed towards biotechnology interests. As for BSE, the government spent 10 years reassuring the public that BSE could not cross the species barrier from cattle to humans, while restricting relevant data to research institutes and creating a distinction between in-group and out-group scientists.

This criticism suggests that the British government failed to appreciate one of the most compelling benefits of the PP – its democracy-enhancing qualities. As Feintuck (2005: 398) argues, the PP 'has a potentially crucial ideological function as an instrument for ensuring that collective, often non-economic, democratically-derived interests are given due prominence in processes which may otherwise be dominated and/or damaged by economic interests and related technological imperatives claiming legitimacy through "science" or scientific certainty'.

Conclusion

Many critics have accused the British government of taking an opportunistic approach to the PP – a charge that implies it was unprincipled. But our interpretation of three important cases of environmental policy-making in the UK is that the government applied the meta-principle of circumstance to judge whether to invoke the PP, and if so, which PP to choose, the weak or the strong. In this respect, the UK is similar to most other countries, in that their commitments to the precautionary principle (PP) are also circumstantial – they apply the PP selectively. The implication of this analysis is that stereotypical characterisations of national styles of environmental regulation may be misleading, masking the extent to which countries respond to environmental crises on a case-by-case basis – i.e. in unpredictable and idiosyncratic, rather than deterministic, ways.

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Bibliography

- Advisory Committee on Releases to the Environment (ACRE) 2004. Advice on the Implications of the Farm Scale Evaluations of Genetically Modified Herbicide-Tolerant Crops, London: ACRE.
- Barrett, K. and Raffensperger, C., 1999. Precautionary Science. In C. Raffensperger and J.A. Tickner eds., *Protecting Public Health and the Environment: Implementing the Precautionary Principle*. Washington DC: Island Press, 106-122.
- Bartlett, D.M.C., 1999. Mad Cows and Democratic Governance: BSE and the Construction of a "Free Market" in the UK, *Crime, Law and Social Change*, 30, 237 – 257.
- Beck, U., 1992. *Risk Society: Towards a New Modernity*. London: Sage.
- Boehmer-Christiansen, S., 1994. The Precautionary Principle in Germany – Enabling Government. In T. O'Riordan and J. Cameron eds. *Interpreting the Precautionary Principle*. London: Earthscan, 31-60.
- Brown, P., 2000. Government to Investigate Claims by "Sheep Dip Victims." *Guardian*. Available from: <http://www.guardian.co.uk/archives/htm>. 30 March. [accessed 02/06/01]
- Burke, E., 1790. Mr Burke's Reflections on the Revolution in France. In H. Rogers ed. *The Works of the Right Hon. Edmund Burke*. London: Samuel Holdsworth, 1792.
- Cannon, G., 1987. *The Politics of Food*. London: Century.
- Carter, N. and Lowe, P., 2000. The Conservative Government and Sustainable Development in the UK: 1988 – 97. In S.C.Young ed. *The Emergence of Ecological Modernisation*. London: Routledge, 180-189.
- Chemistry and Industry 1996. News Report: Sheep Dip Harms Farmers' Mental Health', website: <http://ci.mond.org/951001/htm>. (accessed 02/06/01).
- Christoforou, T. 2003. The Precautionary Principle and Democratizing Expertise: A European Legal Perspective *Science and Public Policy*, 30 (3), June: 205 – 211.
- Dealler, S. 1996. *Lethal Legacy: BSE – The Search for the Truth*. London: Bloomsbury.
- Department of the Environment (DoE) 1990. *This Common Inheritance*. Command 1200, London:

- The Stationary Office.
- Dryzek, J.S., 1997. *The Politics of the Earth: Environmental Discourses*. Oxford: Oxford University Press.
- Department of Trade and Industry (DTI) 2003. GM Science Review, First Report: An Open Review of the Science Relevant to GM Crops and Food based on Interests and Concerns of the Public. DTI/pub 6704/0 1K/07/03/NP URN 03/949.
- Fairclough, C., 2003. An International Comparison of Policy-Making for Occupational Health and Safety: a case study of organophosphate pesticides. Thesis (PhD). Science Policy Unit, University of Sussex.
- Feintuck, M., 2005. Precautionary Maybe, but What's the Principle? The Precautionary Principle, the Regulation of Risk, and the Public Domain. *Journal of Law and Society*, 32 (3): 371 – 398.
- Graham, J.D. and Hsia, S., 2002. Europe's Precautionary Principle: Promise and Pitfalls, *Journal of Risk Research*, 5 (4): 371-390.
- Grant, W., 1997. BSE and the Politics of Food. In P. Dunleavy, A. Gamble, I. Holliday, and G. Peele, eds., *Developments in British Politics 5*. Basingstoke: Macmillan, 339-343.
- Guardian 2002. Full Text of Tony Blair's speech on British Science, 23 May 2002.
- Harremoes, P., Gee, D., MacGarvin, M., Stirling, A., Keys, J., and Wynne, B., 2002. *The Precautionary Principle in the 20th Century: Late Lessons from Early Warnings*. London: Earthscan.
- House of Commons 2004. GM Foods – Evaluating the Farm Scale Trials, Environmental Audit Committee, Second Report of Session 2003-04, Volume 1, HC 90-1
- Jasanoff, S., 1990. *The Fifth Branch: Science Advisers as Policymakers*. Cambridge, Mass: Harvard University Press.
- Johnston, P. and Simmonds, M., 1990. Letter: Precautionary Principle, *Marine Pollution Bulletin*, No. 21: 402.
- Jordan, A. and O'Riordan, T., 1995. The Precautionary Principle in UK Environmental Law and Policy. In T.S. Gray, ed., *UK Environmental Policy in the 1990s*. London: Macmillan, 58-72.
- Konig, A., 2000. Towards a Common Understanding of the Precautionary Approach? *Foreign Policy Bulletin*, 11: 125-134.
- Lieberman, S. and Gray, T., 2006. The So-called 'Moratorium' on the Licensing of New GM Products by the EU 1998-2004: a Study in Ambiguity. *Environmental Politics*, 15 (4): 592 – 609.
- MacGarvin, M., 1994. Precaution, Science and the Sin of Hubris. In T. O'Riordan, and J. Cameron, eds. *Interpreting the Precautionary Principle*. London: Earthscan, 69-101.
- Mayer, S., 1999. Is This a Harvest Fit for the World? *Guardian*, 18th August.
- McCormick, J., 1991. *British Politics and the Environment*. London: Earthscan.
- Merton, R.K., 1973. *The Sociology of Science*. Chicago: University of Chicago.
- Mickle, J., 1999. Farmers' Illness Link to Sheep Dip. *Guardian*, 2 July. Available from: <http://www.guardian.co.uk/Print/0,3858,3879839,00.html>. [accessed 19/09/02].
- Monbiot, G., 2000. *Captive State: The Corporate Takeover of Britain*. Basingstoke: Macmillan.
- Oldstone, M.B.A., 1998. *Viruses, Plagues, and History*. Oxford: Oxford University.
- Organophosphate Information Network (OPIN) 1999. Briefing: All-Party Organophosphate (OP) Group, 'Organophosphate (OP) Pesticides – Their Uses and Abuses. Available from: <http://www.op-infonet.org/allpartybrief.htm>/ [accessed 19/09/02].
- O'Riordan, T. and Cameron, J., 1994. The History and Contemporary Significance of the Precautionary Principle'. In T. O'Riordan and J. Cameron. eds. *Interpreting the Precautionary Principle*. London: Earthscan.
- Pesticide Action Network (PAN UK) undated. The Hazards of Sheep Dipping: Fact Sheet. Available from: <http://www.pan-uk.org/briefing/sheepdip.htm> [accessed 28/03/01].
- Phillips, Lord, Bridgeman, J. and Ferguson-Smith, M. 2000. The BSE Inquiry Report: Evidence and Supporting Papers of the Inquiry into the Emergence and Identification of Bovine Encephalopathy (BSE) and Variant Creutzfeld-Jacob Disease (vCJD) and the Action Taken in Response to it up to 20 March 1996, (The Phillips Report) London: The Stationery Office.
- Powell, D and Leiss, W., 1997. *Mad Cows and Mother's Milk*. Montreal: McGill-Queens University Press.
- Rowell, A., 2003. *Don't Worry, it's Safe to Eat: the True Story of GM Food, BSE and Foot and Mouth*. London: Earthscan.
- Royal Society 2003. Weeds in Fields with Contrasting Conventional and GM Herbicide-Tolerant Crops. I. Effects on Abundance and Diversity Philosophical Transactions of the Royal Society, 358: 1819 – 1832.
- Saunders, P., 2004. Presentation at Parliamentary Briefing in the House of Commons, 24 January.

- Sigmund, E., 2003. Reams of Research not Disseminated, *Farmers' Guardian*, December 12: 53.
- Sunstein, C.R., 2005. *Laws of Fear: Beyond the Precautionary Principle*. Cambridge: Cambridge University Press.
- United Nations Conference on Environment and Development (UNCED) 1993. Report of the United Nations Conference on Environment and Development, volume 1: Resolutions Adopted by the Conference, New York: United Nations.
- US Commission on Ocean Policy (USCOP) 2004. Preliminary Report of the US Commission on Ocean Policy, Governor's Draft, Washington DC: April.
- Van Zwanenberg, P. and Millstone, E., 2002. Mad Cow Disease 1980–2000: How Reassurances Undermined Precaution. In P. Harremoes, D. Gee, M. MacGarvin, A. Stirling, J. Keys, B. Wynne and G. Vaz, eds. *The Precautionary Principle in the Twentieth Century: Late Lessons from Early Warnings*. London: Earthscan.
- Walker, M.J., 2001. The Great Outdoors: Health Hazards in the Workplace and Elsewhere, *Ecologist*. Available from: (http://findarticles.com/p/articles/mi_m2465/is_5_31/ai_76285452) [accessed 31/10/08].
- Watterson, A., 2003. Interview, 15 December.
- Wells, G.A.H., Scott, A.C., Johnson, C.T., Gunny, R.F., Hancock, R.D., Jeffrey, M., Dawson, M. and Bradley, R., 1987. A Novel Progressive Spongiform Encephalopathy in Cattle, *Veterinary Record*. 121 (18), October: 419 - 420.
- Whiteside, K., 2006. *Precautionary Politics: Principle and Practice in Confronting Environmental Risk*. Cambridge: Mass: MIT Press.
- Wiener, J.B. and Rogers, M.D., 2002. Comparing Precaution in the United States and Europe, *Journal of Risk Research*. 5 (4): 317-349.
- Wolpert, L., 1997. In Praise of Science. In R. Levinson, and J. Thomas, eds., *Science Today: Problem or Crisis?* London: Routledge.