

POLICY NETWORKS AND THE GM CROPS ISSUE: ASSESSING THE UTILITY OF A DIALECTICAL MODEL OF POLICY NETWORKS

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A dialectical model of policy networks is deployed to analyse policy change in the area of GM crops in the UK. The model uses an analysis of the interaction between agents and structure, network and context and network and outcomes to understand and explain how policy change has occurred. A key advantage of the model is that it increases understanding of network transformation, explanation of which has been an alleged weakness of the policy network approach. However, this case study does throw up some weaknesses with the model, including the tendency of the model to emphasize the role of 'insider' agents and downplay the role of 'outsiders' in the policy process.

The Genetically Modified (GM) food and crops case study is interesting for policy analysts for a variety of reasons. First, it offers an example of a conflict between powerful economic interests and the environmental lobby and, what is more, one in which the normally dominant economic interests have been under a great deal of pressure. Second, in the case of GM foods and crops public opinion, and even 'consumer power', appear to have played a significant role. Third, in this area, as in some others, the role of 'scientific experts' has been increasingly questioned. As such, the issue raises very important questions about the power of interests, experts and the public.

Our aim here is to examine the changes that have occurred in policy on GM crops in the UK in the recent period. More specifically, we use the dialectical model of policy networks, developed by Marsh and Smith, to analyse those changes (2000). Of course, there is a lively debate in the policy analysis literature on whether policy networks affect policy outcomes (see particularly Dowding 1995 and 2000; Marsh and Smith 2000 and 2001). To an extent, the different positions protagonists adopt in the debate reflect their differing approaches to social science; in particular their different epistemological positions (see Marsh and Smith 2001; Marsh and Furlong 2002). Not surprisingly, we share the Marsh and Smith position, rejecting Dowding's positivism, and acknowledging that there are different ways to study political science and, thus, different ways to approach the role of

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networks. More specifically, we adopt a realist position. There is no space here to develop our position at length (see Marsh and Furlong 2002). Nevertheless, it is important briefly to explain our position.

Like positivists we do attempt to explain, but unlike positivists, we believe that some relationships between social phenomena are not directly observable and that, for example, the relationship between networks and outcomes is mediated by actors' understandings of them. When the realist talks of explanation, however, they are appealing to a different notion of explanation than that used by positivists. To a realist, not every relationship between variables can be directly observed; one cannot merely generate hypotheses from a theory which one then tests. However, the realist argues that one can support the view that these unobservable relationships do exist.

We can observe other relationships between variables that, in a sense, follow from the unobserved relationships. So, while we may not be able to observe patriarchy or race, we can observe the consequences of these, for example, the fact that so few key women are members of the key policy networks. We cannot 'prove' the existence of patriarchy; clearly some observers might argue that men and women are essentially different (men are from Mars and women are from Venus) and that men are best-fitted and have more of the requisite skills to be in the network. To the realist it is their theoretical position that underpins their argument that patriarchy is operating here; so the theorist utilizing a broadly feminist theoretical position explains the empirical observation, the unequal access of women to key policy networks, as a reflection of patriarchy.

The realist also recognizes the double hermeneutic. So, we stress that any explanation of behaviour has to take into account how the actor understands his or her behaviour recognizing that actors interpret the contexts in which they operate (the first level of the hermeneutic). At the same time, as observers, our understanding of what we observe is partial; crucially it is mediated (a) through the lens of our theory, and (b) that the observers interpret the actions of agents (the second level of the hermeneutic). Hence, any explanation we offer is theory-dependent.

One big advantage a realist has is that they can offer work which is interesting to both positivists and interpretivists. Realists do attempt to explain and a positivist can assess the explanation in their own terms. However, the realist also acknowledges the importance of the double hermeneutic. As such, interpretivists can relate to that aspect of the work of realists, while rejecting the aim of developing explanations.

Raab (2001) argues that the dialectical approach takes us no further than existing network theory. In contrast, Dowding (1995, 2000) contends that the policy network approach lacks a theoretical basis. In particular, he argues (1995) that 'the major problem' is that 'whilst the (network) metaphors are heuristically useful (...) they are incapable of explaining network transformation' (Dowding, 1995, p. 139). Our argument against both these critics is that the dialectical approach gives us a more developed conceptual framework

that can increase our understanding of network transformation and policy outcomes. As such, the model does not simply deploy network 'metaphors'. Rather, it suggests we need to recognize the importance of the three dialectical relationships, between structure and agents, network and context and network and outcomes, in order to understand network change and policy outcomes. Consequently, in our view, the utility of the model should be judged by the extent to which it helps us understand the operation of particular networks and explain their relationship to policy outcomes. Our case study of GM foods certainly involves network change and our concern here is to assess the extent to which the dialectical approach can provide an understanding and explanation of the processes of network transformation and the relationship between policy networks and policy outcomes.

Thus, we have two main concerns, to offer an explanation of GM crop policy changes and to comment on the utility of the Marsh and Smith framework and for that reason this article is divided into two sections. First, we shall briefly outline the dialectical model together with the questions it generates for any study of the effect a policy network has on policy outcomes. Second, we shall address those questions in the context of a discussion of UK GM crop policy.

THE DIALECTICAL MODEL

Marsh and Smith (2000) outline what they term a dialectical model, which is set out in diagrammatic form in Figure 1. They identify three dialectical, that is interactive and iterative, relationships. These relationships are between: (1) the structure of the network and the participants in the network; (2) the network and its political and socio-economic context; and (3) the policy network

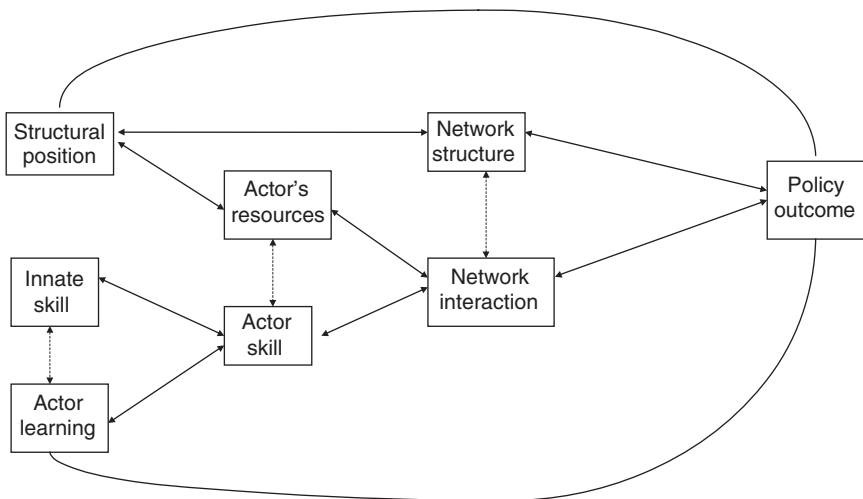


FIGURE 1 *Policy networks and policy outcomes: a dialectical approach*

and the outcome. Their argument is that, in order to understand/explain the relationship between policy networks and policy outcomes, we need to examine each of these dialectical relationships. This is not to say that for each policy area the nature of those relationships will be the same or that each relationship, or each aspect of each relationship, will be equally important across cases. Marsh and Smith, therefore, do not offer a predictive model. Neither do they suggest that the model can be tested in a way that would satisfy a positivist, wedded-to-quantitative analysis, like that of Dowding. Rather, they argue that focusing upon those relationships helps identify the questions we should ask in studying any policy case study, that, using their model/framework, we can assess what role the policy network played in affecting policy outcomes and policy change in any particular case. Consequently, this case study has two central aims. First, we assess the extent to which the model helps explain this particular case and, second, we discuss whether, and how, this case study can be used to clarify, expand or identify weaknesses in the model.

Beyond structure versus agency

Marsh and Smith (2000) stress that policy networks are structures that both constrain and facilitate agents. They are structures that: (1) define the roles the actors play; (2) shape the issues which are discussed and how they are dealt with; (3) have distinct sets of rules; and (4) contain organizational imperatives, so that, at least, there is a major pressure to maintain the network. However, agents matter. Most crucially, structures do not act; agents do. At the same time, the strategic calculations of the actors are shaped by their interpretation of that structural context.

Marsh and Smith (2000) also acknowledge that the structure of networks, and the resource dependencies that they entail, are not fixed. What is more, agents choose policy options, bargain, argue and break up networks. So, agents can, and do, negotiate and re-negotiate network structures. Any explanation of the effect of networks on policy outcomes, therefore, must emphasize the role of agents. It must also acknowledge that the broader context within which the network operates affects the interests and actions of network members. A number of questions are generated from this discussion of the dialectical relationship between structure and agency.

- Who is in the network?
- What resources do these network members have?
- To what extent do these resources reflect the structural position of the interests these members represent and/or the skills and abilities of the individuals who represent these interest in the network?
- Have these individuals changed the structure of the network in an attempt to forward their interests?
- Has the network structure altered the perceived interests of the network participants?

Beyond network versus context

It is a common criticism of the policy network literature that it is better at explaining policy continuity than policy change. In response, authors such as Marsh and Rhodes (1992) suggested that policy change often results from changes in the network. Consequently, there is some focus on trying to explain network change with the literature tending to stress the role of either endogenous or exogenous factors. Marsh and Smith (2000) are critical of this distinction. They argue that, in order to understand how networks affect outcomes, we need to recognize that there is a dialectical relationship between the network and the broader context within which it is located. There are two different, but related, points here. First, policy networks reflect exogenous structures: for example, class and gender structures. The structure of networks, therefore, is likely to reflect the broader pattern of structured inequality within society. Certainly, policy networks are structures that cannot be treated as given; we need to explain their origin and a key part of doing this involves showing how they are inscribed with other structural divisions. Second, network structure, network change and the policy outcome may be partially explained by reference to factors exogenous to the network, but these contextual factors are dialectically related to network structure and network interaction.

Marsh and Rhodes (1992) emphasize four broad categories of change in the network environment which may undermine the certainties and values within particular networks – economic, ideological, political and knowledge-based (for examples of how these can affect networks see Marsh and Smith 2000). Marsh and Smith (2000) point out that other networks are also a crucial part of the broader context within which a particular network is located. Overall, they argue that exogenous changes can affect the resources, interests and relationships of the actors within networks. Changes in these factors can produce tensions and conflicts that may lead to either a breakdown in the network or the development of new policies.

However, they also contend that these changes do not have an effect independent of the structure of, and interactions within, the network. All such exogenous change is mediated through the understanding of agents and interpreted in the context of the structures, rules/norms and interpersonal relationships within the network. So, it is important to re-emphasize that any simple distinction between endogenous and exogenous factors is misleading. This discussion suggests a number of questions:

- How has the network changed over time?
- How has the political, ideological, economic and knowledge-based context within which the network operates changed over time?
- How has the relationship between the network and other related networks changed over time?

- How have members of the network interpreted any changes in the broader political and social context within which the network operates?
- How have the exogenous/contextual factors and the endogenous/network factors interacted?

Beyond networks versus outcomes

The existing literature concentrates upon the question of whether, and if so to what extent, networks affect policy outcomes. There is no recognition that policy outcomes also affect the shape of the policy network directly, as well as having an effect on the structural position of certain interests in civil society and the strategic learning of actors in the network. Certainly, there is no unidirectional causal link between networks and outcomes.

Outcomes may affect networks in at least three ways. First, a particular policy outcome may lead to a change in the membership of the network or to the balance of resources within it (see Marsh and Smith 2000 for an example). Second, policy outcomes may have an effect on the broader social structure that weakens the position of a particular interest in relation to a given network. Third, policy outcomes can affect agents. Clearly, agents learn by experience. If certain actions within a network fail to produce an outcome beneficial to an actor within the network and the organization he represents, or, more broadly, to the network as a whole, then that actor is likely to pursue other strategies and actions. This brief discussion suggests three questions:

- Have previous policy outcomes affected the structure of the network?
- Have previous policy outcomes affected the broader political and socio-economic context within which the network operates?
- Have the strategy/tactics pursued by members of the network changed as a result of their prior experience in the network?

THE CASE STUDY: GM CROPS IN THE UK

In order to help link the theoretical model to the case study it may be useful to summarize the changes in the network structure, the changes in policy outcomes and the linkages between the two. As can be observed in table 1, in the UK, the 1998–99 period saw a change in the GM policy network from being one where pro-biotechnology interests predominated, and where MAFF, the then Ministry of Agriculture, Fisheries and Food, rather than the DETR, the Department for Environment, Transport and the Regions, took a leading role, to a network where wildlife protection groups featured prominently and where the DETR, rather than MAFF, took a leading role. Policy outcomes changed in that the licensing of GM crops was made conditional on the crops satisfying wildlife protection criteria evaluated by crop research trials. Previously no such conditions were set in the crop licensing regime. Furthermore, the commercial planting of GM crops was frozen until the crop research trials had been conducted and evaluated. The involvement of wildlife protection groups in the reconstituted policy network was essential

TABLE 1 *Changes in GM policy networks*

Membership of GM industry policy community until October 1998	Membership of GM environmental protection policy network from October 1998	Groups excluded from both policy networks
• Biotechnology companies • Crop Protection association (CPA) • NFU • Seed producers • Farm produce distributors • The groups above were coordinated by SCIMAC (GM crop lobby) from June 1998 • MAFF • 'Pro-biotechnology': majority of scientists on the Advisory Committee on Releases into the Environment • DETR (passive)	• SCIMAC (GM crop lobby co-ordinating biotechnology companies, NFU, CPA, seed producers, farm produce distributors) • DETR (active) • MAFF • 'Independent' scientists on Advisory Committee on Releases into the Environment • English Nature • RSPB • Game Conservancy Trust	• Friends of the Earth • Greenpeace • Soil Association • Action Aid • Other Anti-GM groups

if legitimacy was to be given to the new licensing regime and they demanded a freeze on commercial planting of GM crops while the research was carried out and evaluated. It is notable that it is the concerns of English Nature, the statutory wildlife protection body, that were incorporated into policy outcomes, rather than the much wider concerns of radical anti-GM groups.

Our case study addresses the questions posed in the section on the theory of the dialectical approach to policy networks (pages 232–4). We begin with an overview of the changes in the policy network and the policy outcomes that are concerned with the environmental evaluation of GM crops. Subsequently, in three sub-sections, we assess the utility of the dialectical model as an explanatory tool in this case. However, it is important first to raise two crucial issues. First, consumer resistance rather than government regulation provides the chief barrier to the consumption of GM food in the UK. Second, while public opinion on the GM food issue has been chiefly concerned with food safety (Petts *et al.* 2001, 35; CropGen 2000) much of the debate has been concerned with environmental regulation of GM crops. Although much of GM policy is decided at the EU level, various changes in policy and regulatory structure have also been effected at the level of UK policy. These changes have been associated with changes in the policy network dealing with the government's evaluation of GM crops. Let us look at the changing nature of this network.

Changes in the policy network and in policy outcomes

There is strong *prima facie* evidence that, in this case, network change and policy change were related. However, as we shall see in the next three sections, this relationship needs to be explained further.

In late 1996, GM soya, which was imported from the USA, began to appear on UK supermarket shelves. Between late 1997 and early 1998, GM crops and food became controversial issues. At this time, involvement in GM crop policy making was limited almost wholly to the biotechnology and farming industry – based around the Ministry of Agriculture, Fisheries and Food (MAFF). The industrial umbrella organization which has co-ordinated these interests since June 1998 is called the Supply Chain Initiative on Modified Agricultural Crops (SCIMAC), hereafter referred to as ‘the GM crop lobby’.

The GM crop lobby consists of the Plant Breeders’ Association (including the biotechnology companies), the National Farmers’ Union (NFU), the Crop Protection Association (CPA), UK Agricultural Supply Trade Association (UKASTA) and the British Sugar Beet Seed Producers Association (BSBSPA). Until Autumn 1998, these groups, together with MAFF, formed a tight policy network – using the Marsh and Rhodes’ terminology, a policy community (Marsh and Rhodes, 1992; Daugbjerg 1998), concerned with the formulation of government policy on GM crops. The biotechnology industry was also part of the policy community through its influence on the Advisory Committee on Releases into the Environment (ACRE), the DETR’s statutory advisory body covering GM crops (referred to here as ‘The Advisory Committee’). This domination meant that DETR’s involvement in the policy community was largely passive. A survey by Friends of the Earth (FOE), which was published in July 1998, concluded that eight of the thirteen (mostly scientific) members of the Advisory Committee on Releases into the Environment had links with the biotechnology industry (Vidal 1998). The Advisory Committee had already given clearance to some GM varieties and, by the middle of 1998, it was moving towards recommending approval of the planting of further GM varieties. These involved herbicide-tolerant strains that would allow more effective destruction of weeds and estimated productivity increases of around 10 per cent.

The GM industry policy community included a narrow range of interests; that is, only those agricultural/biotechnology economic interests that would benefit economically from commercialization of GM food technology. The community shared a view on the need to produce GM crops.

The interests of leading environmental organizations were not represented in this policy community. Concerns about gene transfer between herbicide-tolerant crops and weeds (arising from research in the US) were seen as an economic problem for farmers, given the persistence of weeds, rather than as a threat to the environment. As a result, the GM crop lobby agreed a set of guidelines (interview with grade 5 civil servant at MAFF, 5/06/01) and MAFF did not establish a programme to research or monitor the impact of GM crops on biodiversity. Crucially, English Nature’s call for a three-year moratorium on commercial planting of these crops was specifically rejected (Rooker 1998).

Later in 1998 the UK Environmental Protection Minister, Michael Meacher, initiated a change in policy. On 21 October 1998, Meacher announced a

year's pause in the commercialization of these crops and a regime of trials, known as farm scale evaluations (FSE), to test the environmental impact of GM crops (Meacher 1998). Over the course of the next year the government then negotiated with the GM crop lobby for a voluntary freeze on the commercial planting of new crops until the research on GM crops had been carried out and evaluated. This meant that no commercial planting of GM crops could take place until 2003.

Hence, the previously passive stance of DETR in the GM industry policy community was abandoned and DETR became the key driving force behind a transformation of the policy community. There were two key structural changes. First, a 'Scientific Steering Committee' (SSC) was established to judge the results of the GM crop trials. The Scientific Steering Committee consisted of independent scientists and scientists from the RSPB, English Nature and the Game Conservancy Trust. Second, the Advisory Committee on Releases into the Environment was reorganized. Ten of the thirteen members were dropped and were replaced by academic experts who had no direct links with the biotechnology industry. Rather, they were chosen because of their expertise in particular scientific fields. In addition, the Advisory Committee's terms of reference were broadened to include the consideration of the impact of GM crops on biodiversity and a sub-group on biodiversity impacts was established which included representatives from English Nature and the RSPB.

The government procedure for deciding whether to permit applications to cultivate commercially specific GM crops involves recommendations being made by the Scientific Steering Committee (based on evaluations of the Farm Scale Evaluation trials), discussions at the Advisory Committee and a public consultation (interview with grade 6 civil servant at the DETR, 1/06/01). Future applications for licenses to grow GM crops commercially will have to undergo similar trials, although they may be done in another EU country according to the revised EU directive (18/01) that was adopted in early 2001.

As such, what we term here a GM environmental protection policy network replaced the GM industry policy community described earlier. This new policy network consists of the GM crop lobby, MAFF, DETR (merged as DEFRA since the UK 2001 general election), the 'independent' academics on the reformed Advisory Committee on Releases into the Environment and, also, 'insider' wildlife protection organizations, namely English Nature, the RSPB and the Game Conservancy Trust (see table 1, above). A transition period took place during which the Scientific Steering Committee was established, the Advisory Committee was reorganized and negotiations about a freeze on commercialization of GM crops continued. By early 1999, the committee memberships were changed, although the roles of, and constraints on, the agents involved in the new network were not fully established until November 1999 when the freeze on commercialization of GM crops was announced.

Using Marsh and Rhodes' (1992) criteria, this GM environmental protection network, which is broader and much less consensual than the previous GM Industry policy community, is neither a policy community nor an issue network. Environmental groups with interests in the subject, such as Friends of the Earth, Greenpeace and the Soil Association (representing organic farmers) and Action Aid, who criticize the potential impact of GM crops on small third world farmers, are still excluded, largely because they are opposed to both the cultivation of GM crops generally and open air trials specifically. In contrast, all the members of the GM environmental protection network support the Farm Scale Evaluation trials and are not opposed, on principle, to growing GM crops.

It is true that some of the more radical environmentalists have been given a formal consultative voice through the membership of sympathizers on the Agriculture and Environment Biotechnology Commission (AEBC), which was established in early 1999 with a remit to encourage broad-ranging debate about the future of GM crop policy. However, this body has no statutory responsibility for deciding the fate of applications for commercial GM crop licenses. It includes all the main interests concerned with GM crops issues but, as a DETR civil servant put it: 'would sometimes find difficulty in even agreeing the time of day' (interview with grade 6 civil servant at the DETR 1/06/01). The Commission is, therefore, little more than an institutionalized issue network.

There is a *prima facie* case that the nature of the GM industry policy network influenced the construction of problems in economic rather than environmental terms. This is particularly clear in the discussions that arose about the proliferation of GM superweeds, where the focus was on the costs of eradicating them. In addition, the nature of the GM environmental protection policy network seems to have influenced the construction of the GM crop dispute as a wildlife protection issue. Crucially, this network's construction is at odds with that of radical environmentalists, who see the issue as involving choices between both locally controlled organic farming and industrial farming controlled by multinational corporate interests. The institution of patent rights gives biotechnology companies rights to insist that the farmers buy seeds from the company every time the patented seeds are sown (interview with Patrick Holden, Director of the Soil Association, 06/07/01).

Utilizing the dialectical model

We have established who is in the GM policy network(s). Here, we look in turn at the three dialectical relationships identified by Marsh and Smith (2001), between: structure and agents; network and context; and network and outcome.

The dialectical relationship between structure and agency

Here, we look first at the structural constraints on this policy, then at the actions of agents, before finally focusing on how the two interact.

The structural constraints: One of the problems with the literature on structure and agency is that it is not always clear what is meant by structure, or indeed agency. In particular, it is often unclear whether a dominant discourse can be viewed as a structure; an ideational structure that can constrain and facilitate in the same manner as social, economic or political structures. We operate with this notion of structure. Indeed, we would suggest that the discourse that underpins the network structure in this field plays a particularly important role. This dominant discourse delineates what counts as knowledge and thus exercises a powerful effect on thinking about GM foods and (consequently) government policy (Toke 2000). Hence, it operates as a key structural constraint on agents involved in this policy area; if they don't accept the concomitant government policy, they are excluded from the policy-making process. For example, the radical environmental lobby's refusal to accept the limited interpretation of what is meant by environmental testing of GM crops, associated with the dominant discourse (that environmental testing should be restricted to testing impact on wildlife), is a crucial factor influencing their exclusion from the GM environmental protection network and therefore their ability to change policy details.

The dominant discourse of governmental policy (which involves seeing environmental protection as focusing mainly on wildlife protection) has been accepted by all network members, including the GM crop lobby, but is vigorously contested by organizations such as the Soil Association who do not favour GM food under any circumstances.

In contrast, the Soil Association argues that other environmental issues, such as gene transfer to bacteria in the soil and other related species and contamination of nearby crops, are not being studied in the GM crop trials (interview with Patrick Holden, Soil Association, 06/07/01). MAFF (now DEFRA) and the GM crop lobby regard what is monitored as a 'scientific issue' as something to be decided by the Scientific Steering Committee rather than a policy issue to be decided by public debate (interview with Dan Pearsall, Secretary to Supply Chain Initiative for Modified Crops, 26/06/01 and interview with grade 5 civil servant at MAFF, 12/06/01).

Hence, the structure of the policy community excludes not only certain groups but also certain policy items from the agenda. Indeed, the network structure is designed precisely to achieve this aim. Groups, who are otherwise credible and representative of significant interests, are excluded because they disagree not only with the scientific criteria selected for the evaluation of the GM crops, but also with the very notion of doing open air research trials at all. As we shall see when we consider the relationship between network and context, the radical environmental groups did help to shift the policy agenda, encouraging the transformation of the GM industry policy network. However, at the same time, the government's own desire to reconcile environmental pressures with the interests of the biotechnology and allied farm interests meant that the shape of the new GM environmental

protection network acted to limit the policy agenda to exclude the radical environmental groups. Their 'in principle' opposition to commercialization of GM crops would have made any agreement with the GM crop lobby virtually impossible.

There is also evidence that the structure of the GM environmental protection policy network endowed members with significant resources which they would not have otherwise possessed. This interpretation is supported if we look at the dispute which emerged shortly before the UK 2001 general election about whether a specific FSE trial should take place.

Supporters of the organic movement mounted a campaign against a planned trial of GM maize by the Aventis biotechnology company near Ryton, in the English Midlands. The problem was that the trial was in the vicinity of the Henry Doubleday Organic Research Centre and supporters of organic farming claimed that pollen from the trial site could contaminate the organic research centre, even though it was over 2 miles away from the organic plots. Aventis resisted at first, but the RSPB threatened to resign from the SSC unless the trial was abandoned and the trial was duly abandoned.

The RSPB's action is very significant for our analysis. The RSPB used its network membership as an additional resource to back the legitimacy it draws from its large membership. The government pressed Aventis to cancel the trial because the resignation of the RSPB from the Scientific Steering Committee would have greatly reduced the perceived legitimacy of the Farm Scale Evaluation trials. The biotechnology companies were reluctant to agree as they needed the trials if their crops were to be licensed for commercial use. Yet, they were persuaded to end this particular trial. Here, the actions of one agent, a biotechnology company, were influenced by those of another agent in the same network, namely the RSPB, who used the resources of the network structure to influence the policy outcome. The resources the RSPB used here are at least partly structural in nature, so this seems to be an example of how agents are constrained by the structure of policy networks.

The network structure also imposes constraints on the ability of the network agents to evaluate the environmental impact of GM crops. The agents are restricted because they have agreed to those criteria set out in the terms of reference for the Farm Scale Evaluation studies. Precise guidelines describing the types of data to be collected have been issued to the contractors involved in the ecological studies (DETR Biotechnology Safety Group 2001). English Nature or the RSPB, for example, cannot unilaterally include other criteria, which are not being scientifically examined, on the agenda for discussion in the Scientific Steering Committee. Likewise, the biotechnology companies would find it difficult to disregard data collected in studies being carried out under the terms of reference of Farm Scale Evaluation.

As we have indicated, network members possess other structural resources, besides membership of the network; indeed it is partly because they possess such resources that they are members of the network. Of course, the

government possesses the key resources since it is they who administer and interpret domestic and European legislation on GM policy and they have a range of financial and political levers at their disposal. However, regulations, whether domestic or European, are also a possible resource for other groups. The biotechnology companies, therefore, have tried to persuade the UK government to accept existing European regulations that prevent a moratorium on the commercial planting of GM crops being imposed unilaterally by a member state. Indeed, one crop, a GM maize produced by Aventis, already had EU consent for commercial planting. Moreover, biotechnology companies can claim to deliver potential economic benefits (jobs, exports, and so on) and in this they had the support of MAFF. Consequently, the biotechnology industry and farming interests are still important members of the GM environmental protection network, albeit represented only by one observer on the Scientific Steering Committee. They have a crucial resource in that their co-operation is essential if the research programme is to be effectively pursued.

English Nature has the supremely important resource of being the body with statutory responsibility for nature protection. They can also cite the government's acceptance of the 1992 Biodiversity Treaty which commits signatories to promoting practices that enhance, or at least do not reduce, biodiversity. In addition, English Nature stress that they provide a voice for popular aspirations about nature protection (interview with Brian Johnson, English Nature, 16/5/01), giving the organization a quasi-NGO status to buttress its formal governmental responsibilities.

The RSPB is, after the National Trust, the largest NGO in the UK. It has over a million members, a figure that is significantly larger than the combined memberships of all UK political parties. The RSPB is a long-established 'insider' group as far as environmental protection policies are concerned. It has a staff of around a thousand which includes a number of scientists and political lobbyists. Hence, their resources include the legitimacy conferred by their massive membership and also the size of their organization.

The Game Conservancy Trust, on the other hand, while formally being a registered charity and an NGO, has a quasi-statutory role in that it is the prime source of advice to government on public policies towards game, wildfowl, deer and freshwater fish. The Game Conservancy Trust actually has two representatives on the Scientific Steering Committee. Hence, the key resources of the Game Conservancy Trust are its legitimacy as the traditional provider of information to government on key aspects of countryside wildlife matters and the information it derives from its role as a manager of, and researcher into, countryside wildlife.

The role of agents: In discussing the role of agents, Marsh and Smith do not discuss the distinction between individuals and organizations as agents. They argue that: 'outcomes cannot be explained solely by reference to the structure of the network; they are the result of the actions of strategically

calculating subjects' (Marsh and Smith 2000, p. 6). This is fine as far as it goes, but the 'strategic calculations of the subjects' will be shaped by the internal norms and perceived organizational objectives of the groups that are represented by the individuals concerned. In our description of network change in this policy area we focused on groups, rather than individuals, as agents. So, for example, English Nature has all the financial and network resources reflecting its position as a statutory organization. They also have the resources which stem from the expertise of the individuals that represent them, yet such expertise is employed by English Nature; as such, it is probably best seen as a property of the group rather than of an individual who acts in its name. There are certainly issues here in the Marsh and Smith model which need looking at more closely.

The same goes for most of the other agents: even the scientists on the Advisory Committee on Releases into the Environment who assess environmental impact bring expertise from differing disciplines. The scientists representing biotechnology interests, those who lost their places on ACRE, did so because, as a group, their key resource, 'public legitimacy', resulting from their perceived expertise, declined. Once GM food and crops became controversial, public scepticism towards allegedly 'impartial' scientists rose much in the way it did during the BSE (bovine spongiform encephalitis) crisis.

The key point is that groups are themselves collections of agents who can disagree, although in this case there seem to be few examples of NGOs, or for that matter, biotechnology companies, being divided over anything more than presentational issues. The RSPB seemed in danger of splitting when they supported the GM crop trials, but in the event only around a hundred of the million RSPB members are said to have resigned in protest (interview with John Curtoys, RSPB, 20/4/01).

Similarly, when Greenpeace decided to take part in 'crop pulling' activities in July 1999, under the leadership of Lord Melchett as Director, the main division seemed to be between groups, with FOE and the Soil Association being critical in private of Melchett's actions. That being said, there was also some disagreement within Greenpeace about the advisability of taking action. The more militant activists (on this issue) eventually persuaded Melchett about the virtues of direct action. (Honigsbaum and McKie 1999, p. 19).

Of course, there were also significant, if largely tactical, disagreements among biotechnology companies about whether and how to agree to a voluntary 'freeze' on commercial planting of GM crops. However, the position each company took was mainly related to the stage that its GM crop had reached as it passed through the regulatory machinery (interview with Dan Pearsall, Secretary to SCIMAC, 26/06/01).

In many cases the agents we are concerned with in this case study are groups; there is, however, a case for arguing that Ministers may be an exception. A Minister is likely to construct his self-interest in terms both of implementing Cabinet priorities and safeguarding/advancing his own personal

political position. An example of this may be found in the way Michael Meacher attempted, in the 1998/1999 period, to reconcile environmentalist demands with the priorities of MAFF and its lobbyists.

Meacher was pro-active in organizing meetings with environmental groups concerned about the GM issue. He has also been widely associated with taking a more 'sceptical' attitude to GM food compared to that of the Prime Minister, Tony Blair (Grice 1999). Meacher has been described by Lord Melchett as being part of 'the most committed environment (ministerial) team ever' (Vidal 2000) and he has been credited (alongside environmental groups) with forcing policy changes on the GM crops issue (*Guardian Leader* 2000). It is possible that, if another Labour Minister had been Minister for Environmental Protection, the policy changes might have taken longer to occur, or been more obviously 'forced' on the UK by EU decisions. It may be that Meacher's perceived responsiveness to environmentalist demands helped his position.

The interaction between structure and agents: How do the structure of the GM policy networks and the role of agents interact? Before the autumn of 1998 the problems posed by GM crops were 'solved' by pro-biotechnology agents working out how to manage GM crop cultivation more effectively. However, it is plausible to argue that the actions of key agents such as English Nature and the RSPB have led to changes in the structure of the GM policy network, making it an environmental protection policy network that now considers wildlife conservation issues more prominently. This is in contrast to the old GM industry policy community which was extremely sympathetic towards biotechnology interests.

However, even though English Nature's demand for a moratorium on the commercial planting of GM crops was eventually conceded, the GM crop lobby was still able to use its key resource, its ability to give or withdraw its voluntary consent to the moratorium, to limit research into the relative impact of GM crops on wildlife (see interviews with Dan Pearsall and Stephen Smith (Syngenta), 26/06/01). Moreover, the research comparison to be made was between the relative impact of GM crops and conventional crops on wildlife. In contrast, radical environmentalists wanted a comparison between the relative effects of GM crops and *organic* farming on wildlife.

This decision to restrict research into the effects of GM crops was one factor in restricting the environmental membership of the GM policy network to wildlife protection groups. As we saw earlier, the government's desire to engineer a policy which reconciled biotechnology and environmental interests meant that the radical groups were excluded from the policy network since their demands were irreconcilable with those of the GM crop lobby. The lobby's ability to give or withdraw consent to a voluntary moratorium on commercial planting of GM crops is a resource that it possesses as an agent. This resource is independent of the network structure. However, this resource was used to alter the network structure in such a

way as to constrain the actions of both the government, in terms of what groups could be admitted to the network, and also of the network members, such as English Nature, who have accepted limited research criteria for evaluating the impact of GM crops on the environment.

The dialectical relationship between network and context

In this section we begin by identifying five key dimensions of the context and analysing the effect of these dimensions on the changes in the GM policy networks: societal structural constraints; public opinion; Europe; other networks; and risk aversion. Subsequently, we look briefly at the relative importance of these contextual factors. Finally, we examine the possible effects of the network on that context.

Context and network change

Societal structural constraints: Structured inequality, particularly economic inequality, is a fairly constant feature of the context that affects the network structure. Biotechnology and farming interests, which are relatively rich, powerful, groups, have had a privileged place in the policy process as sponsored client groups of MAFF. In addition, it is arguable that even the environmental interests on the Scientific Steering Committee are privileged interests. So, English Nature is a statutory organization and thus closely linked to government, while the Game Conservancy Trust is associated both historically and currently with farming and hunting interests. More radical groups such as FOE, Greenpeace and the Soil Association, which are certainly middle class but do not represent entrenched economic interests, are excluded from the network. The exception to this latter pattern is the RSPB whose membership, although not appreciably more middle class than, say, Greenpeace's subscribers, is more conservative in outlook than groups such as Greenpeace (interview with John Curtoys, RSPB, 20/04/01). We do not claim here that the dominant network reflects class interests, but it is clear that it is economic, and to a lesser extent professional, interests that dominate the networks.

Public Opinion: There is an association between network change and the changing parameters of public opinion which, in the post-BSE period, have involved major concerns about food safety in general and GM food in particular. Research conducted for Monsanto details the rising concern about GM food. In 1997, 35 per cent of those surveyed said that GM food products were 'unacceptable'. This figure rose to 44 per cent before summer 1998 and 51 per cent in the autumn (McCarthy 1998). Mintel research found that, in the first eight months of 1999, the number of people seeing GM food as the biggest food safety concern rose from 36 per cent to 47 per cent, overtaking even worries about BSE (Gregoriadis 1999).

These changes in public perceptions of GM food can be mapped on to a series of events that may be seen as drivers of the changing political context.

Friends of the Earth launched a campaign for a moratorium on commercial planting of GM crops in October 1997 (Riley and Bebb 1997). Greenpeace and anti-GM networks organized 'crop pulling' of GM field test sites around that time. In December 1997 English Nature began 'insider' lobbying for a moratorium on commercial growing of GM crops (Henke 1997).

Public concerns about GM food and crops were also fanned by various other incidents. One was the controversy over the experiments by Dr Pusztai (broadcast on the TV World in Action Programme in August 1998) which suggested that genetically modified potatoes may have harmed rats. Radical environmental groups organized (ultimately very successful) campaigns urging consumers to persuade supermarkets not to stock GM products. In April 1998, the supermarket chain Iceland became the first to announce that it had removed GM products from its own brands. The campaigns by radical environmental groups against GM food were reinforced by sometimes virulent campaigns in tabloid newspapers, most especially the *Daily Mail's* 'Frankenstein Food' campaign which was launched in February 1999. As regards broader environmental concerns, organic farmers, led by the Soil Association, campaigned against nearby GM crop trials, their argument focusing on claims of possible 'contamination' by GM crops that would bring into question the status of their organic crops.

Sensing that an imminent go-ahead at an EU level for commercial planting of a collection of new GM crops would prejudice its calls for a moratorium, English Nature went public with its demands in June 1998. They demanded three to five years of research into the impact of GM crops on wildlife and a freeze (originally known as a moratorium) on commercialization until then (English Nature *et al.* 1998). English Nature worked closely with other 'insider' wildlife protection organizations, including the Scottish Natural Heritage and the Countryside Council for Wales, the RSPB, the British Trust for Ornithology and the Game Conservancy Trust. They feared that, regardless of whether the new herbicides were toxic or not in themselves, the mere fact that they were more effective in killing weeds (without affecting the GM herbicide resistant crops) meant that birds would have less seeds and insects to eat. This is particularly important in the UK, where, in contrast to the US, the large bulk of countryside is taken up by farmland. At the same time as English Nature's press campaign, Prince Charles, a long-standing supporter of organic farming, spoke out against GM crops in a feature article in the *Daily Telegraph* (HRH The Prince of Wales 1998).

Europe: Similar pressures were occurring across the EU and, consequently, the European Commission decided to cease the issuing of consents to GM crops while a review of the regulatory procedure was being carried out. Indeed, a representative of the GM crop lobby argues that the UK government's change in policy on GM crops was largely in anticipation of changes

at an EU level which seemed likely to include a stricter regime of testing and monitoring GM crops for their impact on biodiversity (interview with Dan Pearsall, 26/06/01).

Other networks: The more radical opponents of GM crops constituted their own network, although radical opponents also have regular contacts with the more mainstream environmental organizations represented in the GM environmental protection policy network. In particular, before their decision to support the GM crops research trials, the RSPB worked more closely with the radical opponents of GM crops. These conflicting loyalties affected the policy community when, in the run-up to the 2001 general election, the dispute between the organic Henry Doubleday Research Centre and Aventis blew up. As we saw earlier, the Soil Association, in particular, were grateful for the RSPB's intervention (interview with Patrick Holden, Soil Association, 06/07/01). We can see here that the RSPB's relations with a network external to the GM environmental protection network may have affected that policy network and the outcome of this particular issue.

Risk-aversion as a cultural context: It is possible that the changes in the political context of GM food are related to longer term changes in society which have led people to become more averse to potential risks from new technology (ESRC Global Environmental Change Programme 1999). The change in the specific context of GM foods, therefore, may have a great deal to do with the way in which environmentalists have plugged into this pre-existing 'risk society' consciousness which has been described most famously by Beck (1992). The BSE crisis has acted as a strong reinforcement for the distrust of establishment scientists that is implicit in this attitude.

Environmentalists interpret the changes in public attitudes about science and technology as providing support for the implementation of the 'precautionary principle' which, put simply, says that absence of evidence of risk should not be mistaken for absence of risk. The argument is cited by ministers in support of increasing regulatory constraints on the development of GM crops (Meacher 1999).

The relative importance of these contextual factors: In our view, and this of course reflects our epistemological position, it is not possible to establish which is the most important of these contexts if we are to explain network and policy change. In large part that is because the agents involved have differing interpretations of these contexts. While environmental groups tend to stress the importance of their own campaigns in influencing networks and outcomes, biotechnology companies may stress the importance of changes in EU policy. Clearly, the environmentalists have an interest in ascribing influence to themselves, whereas the biotechnologists have an interest in downplaying their influence.

The network affects the context

Some ways in which network affects context are more apparent than others. While structured inequality in society may affect the nature of GM policy networks, it seems unlikely that there is going to be a significant reverse effect. However, even in this case it appears that, because environmental issues privilege some elite interests rather than others, the character, if not the existence, of economic inequality may be altered by environmental processes in general. We can also argue that the GM food issue has further entrenched the 'risk society' culture to which we referred earlier.

Changes in network have a more direct impact on context in relation to the 'public opinion' dimension. The then Conservative Party Leader William Hague's backing for English Nature's call for a moratorium on commercial planting of GM crops at Prime Minister's Question Time on 4 February 1999 was followed by a sharp increase in the volume of press coverage. This coverage only began to decline after the moratorium was agreed in November 1999 (Key word search ['GM Food' and 'GM Crops'] of *Independent*, *Guardian* and *Financial Times* newspaper databases). This moratorium, as discussed earlier, was only made possible as a result of the clarification of the GM trial research 'rules' by the new GM environmental protection policy network. It could be argued that the full establishment of these parameters constituted a type of political settlement which, as the Government intended, dampened political demands on the government for action on the issue. However, while the intensity of concern may have subsided, GM foods remained absent from supermarket shelves.

As anticipated, actual changes in EU policy have influenced the nature of UK GM policy networks, so the changes in UK GM policy networks, when aggregated with network changes in other EU states, will influence EU policy. A new directive was issued in March 2001 and discussions continued on controversial issues such as the labelling and allowable separation distances between GM and non-GM (especially organic) crops.

During the period when the GM industry policy community predominated, there was significant co-operation and exchanges between insider and outsider environmental groups. An effective GM environmental network therefore existed. However, the incorporation of some insider environmental groups into the GM environmental protection policy network fragmented this network. Instead, exchanges between the radical environmental groups were emphasized, leading, for example, to the launching of the 'Five Year Freeze Campaign' in February 1999. This campaign opposed the Farm Scale Evaluation trials and called for a ban on all imports of GM food.

The dialectical relationship between networks and outcomes*Networks affect outcomes*

In terms of changes in government policy, the public controversy concerning the environmental impact of GM crops led to research and evaluation into the impact of GM crops on wildlife and a voluntary moratorium on the

commercial planting of GM crops in the UK. The operation of the policy networks concerned with environmental protection policy in general clearly affected that outcome. English Nature is the official statutory nature protection body and so it is not surprising that the 'environmental protection' aspect of GM crop policy has been fashioned in the image of English Nature's concerns.

Radical environmental groups like Friends of the Earth and Greenpeace have little or no place in the formal environmental policy decision-making machinery. On the other hand, the RSPB and the Game Conservancy Trust are widely represented, including representation (alongside English Nature and others) on the crucial National Rural Development Forum. The Forum disburses increasing farm subsidies earmarked for environmental conservation purposes. The Soil Association is also represented on the Forum, although the small number of organic farmers (under 2 per cent) restricts its influence compared to that of the NFU – a body which is broadly sympathetic to the development of GM crop technology.

Other non-governmental members of the GM environmental protection policy network – who represent the biotechnology, crop protection and farming interests – were sponsored by MAFF. The new policy on GM crops, therefore, emerged in the context of a policy network consisting of organizations which were already sponsored by, and therefore in policy networks with, MAFF. This conditioned the terms of engagement within the new GM environmental protection policy.

Outcomes affect networks

Of course, the relationship between outcomes and networks is interactive. It is not just that networks affect outcomes. The policy outcome, namely the government's decision to test GM crops for their impact on wildlife, clearly affected the nature of the GM environmental protection network which emerged after October 1998. Wildlife protection groups had to be involved in the network if the environmental evaluation was to have legitimacy. There had to be a moratorium on commercial planting while the FSE trials were being conducted and evaluated if the GM environmental protection network was to remain stable. English Nature's tactics have been affected to the extent that it has reduced its public campaigning; GM industry interests have accepted tests on wildlife impact as a condition for the granting of commercial licenses. The radical environmental groups, meanwhile, appear to have hardened their sets of demands.

As for future policy developments, the structure of the GM environmental protection network is itself influencing the outcome of the environmental evaluation of GM crops through FSE trials. This is because the only environmental groups which are represented in the policy network are those concerned with the impact on wildlife. Other environmental groups with wider concerns do not have the opportunity to influence the decisions of the Scientific Steering Committee and the Advisory Committee on Releases into

the Environment. The post-Farm Scale Evaluation public consultation on GM crops will be based on a carefully selected agenda, that of wildlife protection, rather than the broader anti-GM agenda promoted by radical groups. Unless radical environmental groups succeed in altering the political context sufficiently to change the policy network again to incorporate their interests, some, if not all, of the crops currently being evaluated seem destined to gain consents for commercial planting.

However, whether there will be a market for GM crops in the UK is another issue. The non-stocking of GM food by shops could be said to be a policy outcome, albeit one produced by decisions by non-governmental agents. If this 'outcome' persists then it may feedback, eventually, to impact on the governmental policy networks. For example, if organic food (whose prospects have been promoted by the organic anti-GM campaign) gains a much larger market share, then this is likely to result in the organic farm movement, including the Soil Association, being accorded a more prominent role in agricultural and environmental policy networks in general.

On the other hand, it is possible that a green light for GM crops from the GM Environmental Protection Policy Network following the Farm Scale Evaluation, may reduce public concern about GM food. A spokesperson for the British Retail Consortium regards this as unlikely. The problem is that GM foods are seen by consumers as giving them no benefits, only risks. Consumers may warm to GM foods when they can offer health benefits (interview with John Morris, Food and Drink Executive for the British Retail Consortium, 29/08/01). However, such technical changes seem a long way ahead.

CONCLUSION

This account of the GM crops issue in the UK illustrates the utility of the dialectical model of policy networks. Dowding (2001) asserts that traditional policy network analysis does not explain network transformation. However, much of the 'added value' which the dialectical approach to policy networks brings to the theory of policy networks lies in its ability to explain network transformation (or, conversely, network stability). This 'value added' is demonstrated in this study. Hence, from our perspective, Raab (2001) is wrong to say that the dialectical model adds nothing to network analysis. Of course, this gain may be at the expense of some of the parsimony of traditional approaches, but it is a price worth paying if it helps us, for example, to explain how policy change on GM crops has occurred. We can see how a GM crop policy network dominated by biotechnology and farming interests has been transformed, through the interactive relationships between network structure and agents, network and context and network and outcomes, into a GM policy network which takes on board the concerns of the more establishment-oriented wildlife protection groups. We are not saying that without a dialectical model one could not develop an adequate explanation

of policy change in this area. Rather, we are saying that the dialectical model, by focusing on these three key dialectical relationships, facilitates the development of such an explanation.

At the same time, this case study highlights a number of weaknesses in the Marsh and Smith model.

- Marsh and Smith (2000) do not distinguish between individuals and groups as agents. Our earlier discussion suggests that this distinction needs to be clarified. In our case study it seems that the most influential agents were groups, perhaps with the exception of government ministers.
- The model may also exaggerate the influence of 'insider' groups at the expense of 'outsider' groups. For example, while the role of English Nature is given great prominence in our account based on Marsh and Smith's model, it is plausible to argue that the role of campaigning radical environmental groups is just as big, perhaps bigger, than the insider groups. The insiders may have influenced policy details through the policy network, but the radicals may have had more influence through agenda-setting. On the other hand, this is likely to be a weakness of policy network approaches in general and, to the extent that the dialectical approach does give an important emphasis to the interaction between network and context, the dialectical model may be less affected by this weakness than other approaches to policy network analysis.
- The model also focuses exclusively on policy outcomes emanating from the policy networks. In contrast, in this case it is at least arguable that a key policy outcome is the disappearance of GM foods from supermarket shelves, an event that has been decided, not in governmental policy networks, but by the supermarkets under pressure from anti-GM campaigners and consumers. If there is no market for GM food, then commercial growing of GM crops will effectively have been prohibited whatever the regulations may say. In general, policy network theory suffers from a blind spot in instances where outsider pressure can be associated with network change and changes in outcomes.

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