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Environmental Governance:

The Power and Pitfalls of Participatory Processes

by

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ABSTRACT

Public and stakeholder participation in decision-making has become 'common jargon' in many industrialised countries, driven by recent legislation and international agreements. Substantial experience and good practice guidance for participatory processes (including participatory technology assessment) now exist, largely based on specific, often local, initiatives. However, many fundamental aspects remain inadequately addressed or problematic. Definitions of participation tend to be all-encompassing and vague and this paper argues that more attention should be paid to the conceptual premises of participation. Also, how to scale up these processes and treat their outcomes at the national and international level within the boundaries of current legislation is unclear. The example of the commercialisation of agricultural genetically modified organisms in Europe is used here to explore which participatory processes have been used and the issues they raise in terms of environmental governance, the implications for institutional change, and the type and role of science in decision-making.

Keywords: *participatory processes, environmental governance, GMOs, institutional change, science and society*

INTRODUCTION

Some observe that representative democracy is no longer sufficient in formulating environmental policy and taking decisions on long-term choices. Reasons range from lack of trust in the existing advisory and decision-making mechanisms (e.g. established expert-based analytic approaches) to questioning underlying motives and communicated assertions of the governmental decision-making apparatus (Grove-White 1999; Wynne 2001). Furthermore, by and large there are no formal structures within that apparatus that allow the public or stakeholders to directly voice their, possibly conflicting, viewpoints, values and ethical concerns on specific issues or policies (De Marchi and Ravetz 2001; Levidow and Marris 2001). These, however, may be regarded as important in debates about environmental issues which are often complex, far-reaching and characterised by high risks (Beck 1992). Also, substantial uncertainty – in terms of the occurrence of an event and its understanding and description – and ignorance exist for many environmental problems and in connection with technological innovations and developments (e.g. Munda 2000; Pellizzoni 2003). The debate and protest around the release and widespread use of genetically modified organisms (GMOs) in agriculture and food production illustrates all the above points, being one salient case of citizens' mistrust and 'democratic deficit'[1]. The issue here is not only about innovation and what type of progress is desirable and acceptable but also about when and how decisions are made and by whom.

'Participatory processes' have been advanced as one way to involve civil society and stakeholders in environmental decision-making, and issues of sustainable development more generally. This has been driven by international agreements such as the Aarhus Convention (UNECE 1998), EC policies on Governance (CEC 2001) and recent EC Directives – notably the Water Framework Directive (WFD)[2] – and their implementations into national laws and regulations. In recent years, there have

1 The phrase democratic deficit is usually used to refer to organisations which are democratic to some extent, but are not as democratic as they could, or should, be (subjective judgement). The United Nations and European Union are often accused of having democratic deficits. (http://en.wikipedia.org/wiki/Democratic_deficit, 25/10/2005)

2 Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, Official Journal L327, 22/12/2000 P. 2001.

been many examples of formalised deliberation amongst and between ordinary citizens, stakeholders and specialists using methodological tools such as focus groups, consensus conferences, citizens' juries and scenario workshops (e.g. Crosby 1995; Joss and Durant 1995; Andersen and Jaeger 1999; Einsiedel et al. 2001), several of these on the topic of GMOs (Carter 2003a). There is also increasing interest in combining deliberative and analytical approaches (see e.g. Rauschmayer and Wittmer 2006; http://www.deliberative-mapping.org).

This paper looks at the current and future potential use of participatory processes for environmental policy formulation and decision-making. The example of the commercialisation of GMOs in agriculture is used here to draw out issues relevant to the wider field of participatory environmental governance and the relationships between scientists, civil society and decision-makers. First, different definitions of and rationales for participation are briefly reviewed. Based on these and actual 'participatory' events carried out on the topic of GMOs, a classification of current types of participatory processes is proposed. Then, using the context of recent events some key good practice elements are highlighted; and persisting challenges with regard to representation and scale discussed. Some limitations and shortfalls of recent experiences can be explained by considering the legal framework and the institutional context for science and regulation. These are used to explore how public and stakeholder concerns can be addressed and the scope for participatory processes improved when used as a discussion input early on rather than decision support at a late stage.

Theoretical Premise and Participation

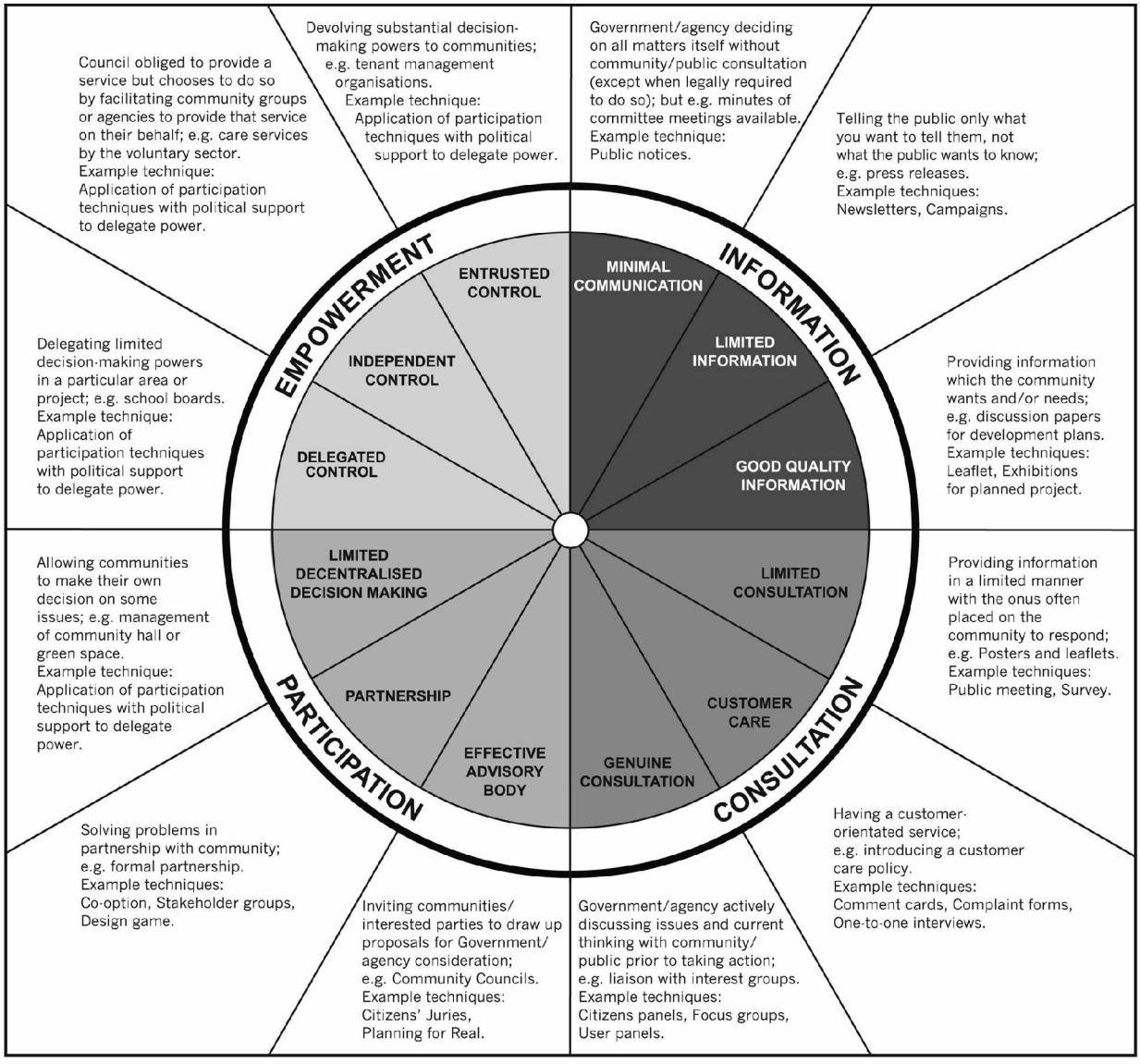
'Participation' has been used in many different contexts and with multiple meanings. Several professions and disciplines have contributed to illuminate different characteristics and underlying ideologies. Some of these are outlined in this section to clarify the different positioning that participation can entail.

Local and Regional Planning Context

Arnstein's (1969) eight-step 'Ladder of Participation' evolved from the different levels of citizen involvement she observed in planning processes in the United States, ranging from top-down non-participative forms such as 'manipulation', via

'consultation' and 'partnership', to 'citizen control', where some or all of the power is redistributed to the participants. To this day non-participative one-way elements are included in classifications of participatory processes, as they are seen as one legitimate way of reaching out to the wider public or stakeholders and informing them. For example, Wilcox (1994), also coming from a community-based practitioners' perspective, proposes very similar categories to those of the participation ladder, namely: information, consultation, deciding together, acting together, and supporting independent community initiatives. Davidson (1998) published the 'Wheel of Participation' (see Figure 1), which like Wilcox's schema,

Figure 1: Wheel of Participation (after Davidson, 1998)



implies that no one level is necessarily better than another but the appropriateness of each is dictated by the specific circumstances. Again, the classification is similar to the earlier ones but exemplifies the different boundaries for defining 'participation' most clearly: information, consultation, participation – comprising 'effective advisory body', 'partnership' and 'limited decentralised decision-making' – and empowerment (stronger element of control compared with previous category).

On the one hand, 'participation' is being used loosely to describe approaches which target or involve the public and/or stakeholders in some way through information and consultation; on the other hand, to refer to a much narrower and more ideological meaning, namely the *active* involvement of participants, that is processes which empower participants to some degree to define issues and influence decisions (Richards et al. 2004).

Environmental Governance Context

'Governance' has been defined and used in many different ways (see e.g. Richards and Smith 2002). In the late 1960s, when the term emerged, its meaning was equivalent to 'governing' or 'political steering'; whereas more recently it is frequently used to mean "a new process of governing; or a changed condition of ordered rule; or the new method by which society is governed" (Rhodes 1996: 652-3). The understanding now is that power-sharing has to become an intricate part of governance visible in the increase in interdependent actions of both State and non-state actors in developing, agreeing and implementing policies and regulations. Environmental governance thus refers to the whole range of institutions and actors involved in the process of environmental decision-making and management and the ways in which they communicate and interact. The environmental governance related literature identifies several rationales for participation and highlights the importance of making decision-making a more open and transparent process, re-establishing who is accountable for what, and who has, or should have powers and responsibilities in the process.

Rationales for initiating a participatory process can be described as 'normative', 'substantive' or 'instrumental' (Fiorini 1990, Pellizoni 2001, Stirling 2006). Normative rationales argue that participation is "both a right of citizens and a route to a more

healthy democratic society" (Beierle and Cayford 2002: 64) by involving all the different constituencies in decision-making (Habermas 1975). Substantive rationales argue that participatory processes can improve the quality of a decision by establishing a broader knowledge base, allowing creative and new perspectives and a deeper understanding which contributes to forming an acceptable solution to a problem (Coenen et al. 1998). Instrumental rationales argue that participatory processes facilitate decision-making and implementation by trying to resolve conflict through negotiations between interested or affected parties and via building trust and identifying common ground. This can be constructive but also misused. Collingridge (1982) describes this process as an effective means to obtain justification for a decision. Stirling (2006) distinguishes between 'strong' and 'weak' justifications: the former signalling that the process confirms a decision prior reached (but often based on different reasons); and the latter where no particular outcome was initially favoured, but should the particular decision run into problems the blame could be managed and directed away from the administrative or political body.

A dilemma of the modern governance approach is that opening up decision-making to a wider circle of relevant actors (horizontally and vertically) tends to complicate decision-making structures and paths and can blur, rather than make transparent, who is accountable for what, be it during a decision-making process or regarding the outcomes and consequences of that process (see e.g. Richards and Smith 2002). In that respect, achieving transparency and clarifying accountability in environmental governance is important to gain acceptability and legitimacy, but remains an ongoing challenge. In addition to increased cooperation between state and non-state actors, we have also witnessed an increased interdependence of governments or actors at different institutional or territorial levels (e.g. local, regional, national and international). This added dimension is reflected in the increased use of 'multi-level' governance (see Bache and Flinders 2004) and again may obscure rather than facilitate transparency and accountability. It may also complicate when and at what level to open up the decision-making process for public and stakeholder participation.

Social and Political Science Context

Theories and applications from the social and political sciences have shed light onto several other important aspects of participatory processes. 'Power' and 'power

relations' are key issues here. Lukes (1974), for example, distinguishes between observable (overt or covert) and latent forms of power. Power is not only manifest in coercion and force, i.e. causing a subject to do something or stopping a subject from doing something, but also in manipulation, i.e. encouraging a subject to change their preferences or views in a way which curtails their vision, or contradicts their own interests or original thinking. Latent or invisible power thus can manifest itself in pushing certain thinking and decision paths as 'acceptable' or the norm, while others are excluded (see also Science and Society section below: 'Scientists and Knowledge Identities'). A current example is that of 'economic growth' as accepted underlying objective for society, whereas a more society-near perspective may be to talk about 'livelihoods' and societal visions in a wider sense.

With regard to participatory processes, who initiates, funds and/or organises the process (i.e. who sets the agenda and parameters) and who is asked or allowed to participate is crucial from the point of view how it is run as well as seen to be run by those not involved. The degree of ownership and control over the problem definition and process is also key in Figure 1 in defining the four distinct types of public and stakeholder involvement: information, consultation, participation and empowerment. Taking a sociological and linguistic angle on the GM food debate, Cook et al. (2004a) ran several focus groups and found that the greatest single factor in influencing reactions towards specific text excerpts were not linguistic but the participants' perception of the speaker or origin. Thus, it is not just language and content that matters, but also the associated author or source that are critical to how information is perceived, and whether it is trusted and considered acceptable. In that respect, past experiences and events associated with specific bodies and individuals (i.e. experiential knowledge) invariably are significant for any 'new' participatory process.

Funding bodies and organisers are scrutinised in a similar fashion; for example, close connections with the national Government, industry or particular interest groups may be perceived negatively as an intension to manipulate outcomes (e.g. to obtain strong justification). Commonly, top-down processes are contrasted with bottom-up ones, though there may not always be such a clear-cut distinction and hybrid versions do exist. For example, direct pressure from the public or interest groups in the form of petitions, demonstrations, consumer boycotts or lobbying are one form of

participation (De Marchi and Ravetz 2001) and may exert pressure on Governments or regulators to launch a 'formal' participatory process. Such radical forms are often left out in formal analyses of participation and their classification, but can be highly significant in reaching media coverage and the attention of politicians, and thus in demanding a political reaction.

Participatory processes are sometimes labelled 'inclusive' to signal that the process should be open to anyone who feels they have an entitlement to participate, be it because of their special knowledge and insight (commonly associated with experts and stakeholders), or their specific interests and concerns (commonly associated with stakeholders and the lay public). Pellizzoni (2003: 198) labels these 'cognitive' and 'normative' competences respectively.

Many researchers and practitioners distinguish between the involvement of stakeholders, experts and the public. All three terms, though commonly used, have been criticised as problematic or potentially misleading (e.g. Levidow and Marris 2001; Wynne 1995, 2001). The term 'stakeholders' can include primary stakeholders (those with a 'direct' interest or responsibility in the matter, or being directly affected by the outcome of a decision) and secondary stakeholders (those with an indirect interest or less tangibly affected by the outcome). Both sometimes include the wider public, but more commonly they are used to refer to industries and their interest groups, governmental agencies, non-governmental organisations, and other affected or interested parties (see e.g. Carter 2003a). In terms of selecting participants, decisions have to be made about the type and level: should it be the head of a unit, a 'spokesperson' or an ordinary member of an interest group, as each may convey different agendas and perspectives. The term 'expert' appears more problematic (e.g. Wynne 1996), especially as it is seen to imply that certain kinds of knowledge and ways of looking at a problem are more valuable or pertinent than others (i.e., using Pellizzoni's terminology, the 'cognitive' competences are valued above 'normative' ones). One could argue that an experts' view or knowledge may be deep but rather narrow. Also, the boundary between expert and lay person is unclear. A lay person may have equally good insights and relevant knowledge to an 'expert' and also have better understanding of particular local circumstances. Similarly, 'the public' can be seen as a misleading term as it encompasses multiple interests and

groups of opposing views and diverse knowledge and values. As it is problematic to refer to laypeople as a coherent group, some now refer to it in the plural, as 'the publics'. This is not to say that there can be no agreement on principles and key issues. The danger is to assume that the public has a particular view and what this may be, rather than actually finding out what members of the public think and belief.

A further important attribute is whether or not participation is deliberative, or discursive. Deliberation implies that arguments and concerns for the topic under consideration are brought into a forum where exchange and learning can take place, as well as (individual and collective) reflexive thinking based on new insights and improved understanding. The term 'discourse' has been used with different meanings but in the context here could be defined in Habermas' sense as "free and open communication in political life, oriented toward reciprocal understanding, trust, and hence an undistorted consensus" (Dryzek 1990: 38). The characteristics of deliberative and discursive processes are similar to those of Aristotelian practical reason involving reflection upon values, free disclosure of one's ideas, persuasion and prudential judgement. Reasoned deliberation has been identified as key to unconstrained, public and egalitarian political discourse (Habermas 1979) and put forward as an alternative to liberal democracy (which has typically shown power imbalances, strategic behaviour, and closed debates) in the form of 'deliberative democracy' (Benhabib 1996; Cohen 1997; Bohman 1998; Elster 1998; Smith 2003) and 'discursive democracy' (Dryzek 1990).

To conclude, expectations, perceptions and definitions of public, stakeholder and expert involvement vary significantly, but are critical in influencing the capability, acceptability and impact of participatory processes. The importance of these specific characteristics and underlying rationales will be illustrated further in later sections through experiences and observations of actual GM case studies. Before turning to these, however, I will briefly draw out aims and functions of participatory processes and based on a synthesis of the theoretical and practical considerations in this discussion paper offer an alternative classification of participatory processes.

FRAMEWORK FOR CHARACTERISING PARTICIPATORY PROCESSES

Beierle and Cayford (2002: 2-4) give a brief history of public participation in environmental decision-making processes, based on a meta-analysis of US case studies. This can be summarised as having started with a 'managerial' philosophy where experts and governmental decision-makers were charged and entrusted with making decisions in the publics' interest. In the 1960s a more pluralist position slowly emerged based on a perceived need to open up the process to more public scrutiny. The bargaining power of non-governmental and other interest groups have risen ever since. In the 1990s a more popular democratic approach to participatory decision-making began to appear, focussing on common goals and visions and promoting a more communal as opposed to individualistic manner of thinking. Of course, this historical development (also appropriate for Western Europe) has not been in distinct steps from one to the next, but rather explains the evolutionary path of and changing demands on approaches and methods for environmental decision-making.

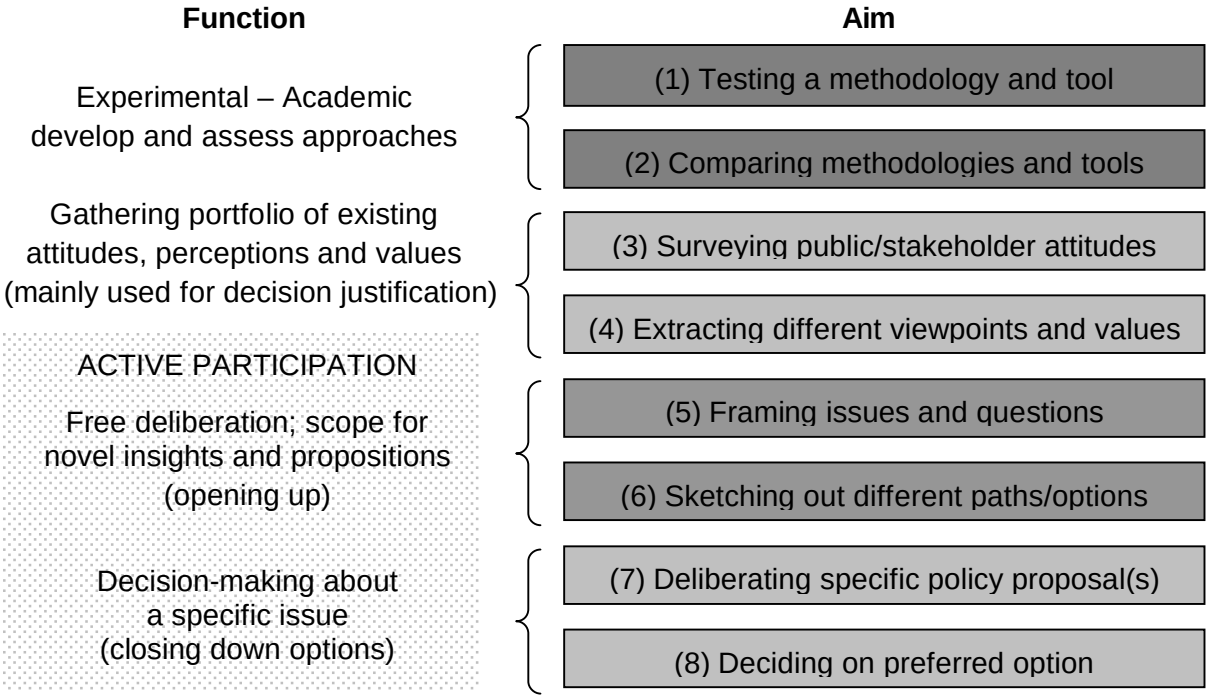
Aims and Functions of Participatory Processes

All these different philosophies can still be found to varying degrees today, and this is reflected in the characterisation of 'participatory' processes with their different aims and functions, as shown in Figure 2. The belief that public and/or stakeholder involvement could improve decision-making or the acceptance of decisions has stimulated interest in using and developing participatory approaches (see categories 1 and 2). Methodological issues can thus form one of several aims, not least to ensure transparency and even-handedness of a process to those outside the particular process (e.g. Stirling and Mayer 1999). Remits and functions overall have ranged from academic experiments to gathering existing views and concerns, to informing a decision in a specific policy context. Most of the processes tend to be targeted at involving ordinary citizens or specific stakeholders, but some are also used to draw out expert opinion (either to contrast perspectives between different experts or to compare so-called experts' views with those of non-specialists). Here it is argued that the term participation should be reserved for processes that enable active participation (corresponding to categories 5-8), in contrast to other forms of involvement, such as information sharing and consultations (as included in Figure 1)

or using attitudinal surveys (categories 3 and 4 in Figure 2) – which have their place but are distinctly different.

Figure 2 may serve as a useful framework to highlight where current uses locate, and which other forms would seem to deserve more attention in future. In terms of active participation, processes fitting into categories 5 and 6 have the best potential to significantly guide and influence decision-making and policy change. Such exercises of opening up the debate and framing different paths of development and policy options could at a later stage be followed up with further deliberative participatory processes on specific proposals or option choices (categories 7 or 8), public polls or a referendum and thereby close down the options or debate and arrive at a specific outcome.

Figure 2: Characterisation of Participatory Processes (after Carter 2003c)



PARTICIPATION IN PRACTICE: EVIDENCE FROM EUROPEAN GM DEBATES

Focusing on public and/or stakeholder involvement on the topic of GMOs, Table 1 (pp. 35-36) lists recent European examples. Most of these have served to elicit general attitudes and values (categories 3 and 4 in Figure 2) or to address specific

and clearly defined decision options (mainly category 7). Purely academic experiments to test or compare particular methods and tools (categories 1 and 2) are, not surprisingly, rare. Participatory processes fitting into categories 5 and 6 are also currently rare since, as will be illustrated below, most processes are pre-framed by decision-makers or experts and not held early enough to allow scoping of different/novel policy options and implementation paths (opening up).

Contexts of Participatory Processes on GMOs in Europe

Most participatory processes in relation to agricultural biotechnologies seem to have arisen from a perceived disquiet of the public and negative media coverage. Their initiation has been somewhat ad hoc, at a perceived point of crisis, rather than an intended element within the overall decision-making process, as most processes took place after 2001 when the regulatory framework for GMOs in Europe was already in place and revised (see Table 1 and section on Legal and Institutional Aspects). The involvement of the public or specific stakeholders is sought to diffuse tension and elicit values and concerns of parties of conflicting viewpoints.

The timing and context of a participatory process, however, is crucial in terms of its potential scope and outcomes. If a debate or decision-making path is already in mid-flow, the remit of such process tends to be limited and pre-defined to fit in with existing agendas and policies. Hence the task of most of the processes listed in Table 1 was restricted to checking public attitudes and preferences on specific issues or likely near future developments. These consultations then end up serving as justification exercises, unless the outcome opposes the current status quo or policy path, as for example happened in the UK GM debate (which overall voiced concern and reservation over GM commercialisation for a variety of reasons). Such processes are then more likely to be attacked for any weaknesses in their design or sampling structure (e.g. Campbell and Townsend 2003), and the limited knowledge and understanding of the participants[3].

[3] Of course, even if the outcome supports current policies, the process may get criticised. This illustrates the importance of underlying values and philosophies, and how information and processes tend to be used to support a particular viewpoint.

Table 1: Examples of European Public and/or Stakeholder Participation Exercises on GMOs (1995-2003)

Country (Year)	Initiator/ Funder	Event	Scale	Participants	Topic of Deliberation	Fig 2 Category
France (1998-99)	Government	Citizens' / Consensus Conference	National	15 Laypeople; Experts; Educators; Public (by invitation); Journalists	Use of GMOs in agriculture and food	3, 4
France (2000)	Government	Public consultation (including national conference)	National	Public; Stakeholders/Actors; Researchers; Communicators	Food politics, with a section on GMOs	3
France (2002)	Government	2-day debate of '4 wise men' and panel	National	4 High-level officials; panel of Stakeholders and Social Scientists; Public (by invitation, including Young People)	GM field tests	3, 4, 5, 6
France (2002)	INRA	Interactive Technology Assessment	Local / Regional	10 Affected parties; 4 Laypersons; Experts; Academic/Evaluator	Virus-resistant GM vineyards	3, 4, 5, 6
Germany (1995)	Government / Research	Bürgerforum	Regional	Laypeople; Experts; Stakeholders	Biotechnology, GMOs	2, 3, 4, 6
Norway (1996)	Government	Consensus Conference 1	National	Laypeople; Experts	GM food and its context	3, 4
Norway (2000)	Government	Consensus Conference 2	National	Laypeople; Experts	GM food and its context	3, 4
UK (1998-99)	Research	Multi-criteria Mapping	National	Experts / Policy Advisors; Stakeholders	GM crops in agriculture	1, 4

Table 1 cont.

Country (Year)	Initiator/ Funder	Event	Scale	Participants	Topic of Deliberation	Fig 2 Category
UK (2003)	Food Standards Agency Scotland	Discussion Groups	Regional (Scotland)	Young People; Low-income Consumers	GM food	3, 4
UK (2003)	Food Standards Agency	Citizens' Jury	Local / Regional	15 Laypeople; Experts; Local Government; Industry; NGOs; Scientists; Scientific Journalist	Should GM food be available in the UK to buy?	3, 4, 7, 8
UK (2002-03)	Government	Public Consultation (various events; internet)	National	Public; Experts; Stakeholders	Commercialisation of GMOs, growing GMOs in the UK	1, 2, 3, 4, 5
France, UK, Germany, Italy, Spain (1998-2000)	EC Research (PABE project)	Focus Groups, Interviews, Workshops	National & International	Public; Stakeholders; Key Actors	Public perceptions of agricultural biotechnology	3, 4

Source: Based on Bioteknologinemnda 2000; FSA 2003; GM Public Debate Steering Board 2003; Kvakkestad 2003; Marris et al. 2001; Marris and Carter 2003; Sandberg & Kraft 1996; Schell & Hampel 2004; Stirling and Mayer 1999

Despite some weaknesses, processes of this type (i.e. having characteristics of consultations rather than active participation) can be inclusive, may contain deliberative elements, and serve a normative purpose. However, feeling the public's pulse on an issue is quite different from fully engaging with their concerns and values from an early stage, and allowing these to influence, shape, or even change decisions and the overall policy course (Marries and Joly 2002). In order to address instrumental and substantive rationales, participatory processes would need the resources and scope to contribute to the framing of the issues, defining options and have some influence on the way decisions are taken and implemented. This, in turn, requires a much stronger link with the actual decision-making process and power relations shaping these.

Link with the Decision-Making Process

Analysing public participation exercises on GMOs conducted in France between 1998 and 2002, Marris and Joly (1999; 2002) observe that they often lacked a link with the decision-making process. This phenomenon also applies to most other examples in Table 1. While consultations and participatory forums are often commissioned by Governments, they avoid stating in unequivocal terms whether these will actually have a direct influence on a decision. Objectives tend to be ambivalent between testing the attitudes or concerns of the wider public and serving as one of several sources informing (but not necessarily affecting) policy. A critical issue for building trust and confidence in the process is to clarify from the outset whether there is a link with decision-making, and if so what form this takes.

To date, the most direct link to decision-making has been the commitment by a government or the commissioning body to formally consider the final report. In the case of the UK 'GM nation?' debate, the Government issued a written reply (DEFRA 2004b). Still, many participants expressed concern that decisions seem to have already been made, and that the outcome of the debate would not affect the UK Government's policy course; hence the exercise was seen as a window-dressing exercise (GM Public Debate Steering Board 2003). The absence of links to the actual decision-making thus disillusioned participants and questioned the effectiveness and relevance of the participatory process.

The scope for defining or redefining the question(s) at stake, and potential 'solutions' or policy directions needs also to be clarified from the outset as part of the link with decision-making. This is important as both research and experience have shown that decision-makers tend to pose specific questions and set a narrow remit (dealing with an issue within the given status quo) whereas participants are strongly concerned about general issues and the broader context of a decision or issue under consideration (often challenging the current status quo). For example, a research project on Public Perception of Agricultural Biotechnologies in Europe (PABE) found that very similar concerns and issues of a broad remit were raised by participants across different countries (see Table 2, left column). Similar messages emerged from the UK public GM debate, called 'GM nation?' (Table 2, right column). Agenda framing is thus an important aspect for participatory processes and a good example of latent power (see above).

Table 2: The Public and GMOs

Themes of public concern from the PABE project	**Key messages from the UK 'GM Nation?' Debate**
Lifestyle orientations, including related food cultures	
Speed of change associated with food technologies	Little support for early commercialisation
Perceived long term uncertainties	Wish for cautionary approach; concerns about long-term effects
Food, health and nature	General unease about GM and a range of broader social and political issues, including impacts on environment and health
Perceived tension between social need and private interests	Wish for demonstrated benefits to society; there are better ways to benefit developing countries than introducing GM crops.
Scepticism towards key institutions	Widespread mistrust of government and multi-national companies
Sense of alienation, lack of agency, lack of control of the life-world	Broad desire to know more and for more research to be done. The debate was welcomed and valued.
The above factors appeared to have a significant influence on participants' views in focus groups deliberations held in five EU countries (France, Germany, Italy, Spain, UK).	

Source: Based on Marris et al. 2001: 31 and GM Public Debate Steering Board 2003: 51-53

To date, for most participatory processes the question(s) to be addressed were predefined by either Government or those commissioned to run the process. A notable exception is the UK GM debate where the framing of questions was based on eight workshops across the UK largely involving members of the public but also active stakeholders and a mixture of pro- and anti-GM researchers (GM Public Debate Steering Board 2003: 11, 13). However, the difficulty remains of how to reconcile the broader concerns of and issues raised by the public with the narrower concerns of a specific policy or decision to be made. Decision-makers seemed to want to hear a clear 'yes' or 'no' (preferably 'yes' in the UK GM case), while public responses indicated more ambivalence and a wish to question surrounding issues and take the opportunity to examine the wider context of agricultural production, trade issues (incl. power and ethical aspects), and environmental and health impacts.

One way to address this discrepancy of scale and range of concerns would be to use participatory events early in policy processes – an opportunity seemingly missed for deciding on the commercialisation of GMOs. At this stage, opening up the debate to a wide spectrum of relevant concerns would be possible and useful. Different issues could be considered and used to help sketch out different potential policy paths. Stirling (2006) advocates using participation (and especially participatory multi-criteria analysis) as a process to allow a more pluralistic, deep and constructive engagement to settle environmental conflicts, i.e. as a 'discussion support tool' (corresponding to categories 5 and 6 of Figure 2). This has received far less attention than its predominant use as 'decision support tool' which has a much narrower remit of closing-down options (corresponding to categories 7 and 8 of Figure 2).

'Horses for Courses'

Depending on the circumstances different approaches and tools are appropriate for involving stakeholders and the public in environmental governance issues. Feedback from events such as consensus conferences and public open debates on GMOs have been positive, largely for the opportunity to bring a wide spectrum of concerns to the table, but also to have the opportunity to question other arguments and learn about new evidence or viewpoints (e.g. De Nasjonale Forskningsetiske Komitèer 1996; Bioteknologinemnda 2000; GM Public Debate Steering Board 2003, DEFRA 2004a). Inclusive and deliberative forms of participation can thus help a

plurality of values and issues to be brought to the fore, and foster learning and understanding among the participants. This type of active participation may, of course, not be appropriate, conducive or practical in all circumstances. This could be because of lack of time and finances, imbalances in power relations, preset agendas prohibiting free debate or certain parties being unable or feeling ill-equipped to express their case in a public forum. In some situations, no participation can be better than a bad participatory process (Richards et al. 2004).

Resourcing and Timing of Participatory Processes

When participatory processes are considered appropriate, they require competent and accepted organisers (danger of actual or perceived bias), skilled facilitators, and sufficient time and financial resources (De Marchi and Ravetz 2001). Despite good intensions, these constraints appear to affect and limit many processes in practice. One example is the above mentioned 'GM Nation?' debate. In 2002, the UK Government commissioned the Agriculture and Environment Biotechnology Commission (AEBC) to oversee the planning and running of the event following the AEBC's overview of different viewpoints among key experts and stakeholders and their recommendation to consider the public's views (AEBC 2001). This public debate was one strand, alongside a science review and cost-benefit study of GM crops. The Government initially allocated 6-9 months and £250,000 to the public debate component and this was much criticised (House of Commons 2003; Mayer 2003). Due to the imposed time framework, the public debate went in parallel to the economic and scientific analyses rather than the outcomes feeding into and informing the debate[4]. In February 2003, the Government decided to extend the review period and put in an additional £250,000, but this new total of half a million pounds was still only about a quarter of the budget available to similar events in New Zealand and the Netherlands, but both have much smaller populations (Select Committee on Environment Food and Rural Affairs 2003). Also, the actual duration of the 'formal' debate still only lasted six weeks, whereas Government best practice for

[4] It is unclear why the Government did not adhere to the original (better) timeframe as proposed by the AEBC; and why it did not set a later deadline for the Public Debate Steering Group to report on the public debate so that other strands of evidence, including field trials, could have been taken account of (House of Commons: Environment Food and Rural Affairs Committee 2003).

consultations is three months (National Consumers Council 2003). This turned out to be inadequate in ensuring the kind and spread of local level engagement of 'ordinary' citizens originally anticipated. Other consequences of the tight budget were that the Central Office of Information was appointed to manage the debate, but it was regarded as neither up to the job in terms of the scope and required expertise of the exercise, nor sufficiently independent of the Government (House of Commons 2003).

Issues of Representation and Scale

Even with sufficient resources, some fundamental issues remain regarding representation and scale and their inter-linkages. Whether or not something is (or perceived to be) representative extends to participants, views and outcomes. Statistical representation is only one aspect; other concerns are normative pertaining to representative democracy and deliberative institutions (O'Neill 2001). Issues include under-representation (e.g. marginalised communities and certain low-income groups) and those who cannot represent themselves (e.g. future generations; non human beings). O'Neill argues that this raises serious concerns about the political and ethical legitimacy of decisions made in their absence, and problems for environmental advocacy and sustainable development decisions more generally. Current deliberative institutions tend to be small scale (such as citizens' juries and consensus conferences) to facilitate interaction and in-depth debate, typically involving between 10 and 15 people. Claims to speak on behalf of others rely on epistemic claims, but so-called representatives often lack authorisation and accountability (O'Neill 2001). Also, the identity of the speaker may change between speaking as an individual and for a group (with differing agendas), and the boundaries may not be clear-cut. O'Neill concludes that such formal participatory approaches need a clearer defined role in our democratic framework and proper sources of contestability of their outcomes. Such contestable forms of representation are the best we can hope for, especially with regard to the interests of and care for non-humans and future generations who, by nature, cannot represent themselves (O'Neill 2001: 497).

In relation to GMOs and technology appraisal recent years have seen a widening of the circle of those involved in advisory bodies which often include 'representatives' of environmental groups, consumer groups, churches and academia (especially social

scientists) – i.e. selected stakeholders and experts rather than ordinary citizens. They have scope to inform the policy debate but have no decision-making powers. As many environmental issues and effects of new technologies go beyond nation states or economic and political unions, cross-national public, stakeholder and/or expert deliberative forums are proposed as desirable or essential (e.g. CEC 2001; van den Hove 2000). Rather than getting a cross-section of citizens in terms of age groups, education, profession, nationality etc. (i.e. being statistically representative), one may instead try to capture a cross-section of interests, arguments and values. This may involve significantly smaller numbers of people and also change the focus away from opinion gathering and towards deliberation and giving 'equal voice'. Davies et al. (2005), for example, propose using Q methodology as part of a purposive sampling frame for recruiting participants, paying more explicit attention to the inclusive representation of arguments and beliefs in society.

LEGAL AND INSTITUTIONAL ASPECTS

Regulatory Framework

A critical issue for any decision process is its institutional, and especially legal, framework for the issue under consideration.[5] Research, commercial activities and environmental policies are increasingly steered and influenced by international rules in the forms of laws, regulations and agreements. Raising concerns and supplying information are crucial and most effective at the time when these rules are being conceived and formulated; visible in the intense lobbying by different interest groups at the national and international levels. In the European Union (EU), the European Commission (EC) provides the regulatory framework for governing the release of GMOs into the environment. The objectives are to harmonise rules in the EU, to protect human health and the environment, and to inform the consumer. It is interesting to note, however, that the EC is not empowered to enact a law on the safety of GMOS as such (Winkler 1999).

[5] For a more detailed overview and analysis of the European and international laws, regulations and agreements on GMOs in agriculture, see Carter 2003b.

Until October 2002, EC Directive 90/220/EEC[6] set out the process for commercialising GM crops and regulating research and development in Europe. The Directive, known as the Deliberative Release Directive, contained optional provisions for consultation with members of the public on releases, and information dissemination in the form of advertising proposed releases in local newspapers, and of public registers containing specified detailed information, including risk assessment information and proposed locations. Objections could be raised by individual member states to an application, but needed to be based on 'scientific' evidence that there was a risk to human health or the environment.

The revised Directive 2001/18/EC[7] tightened the regulations on GMOs, by placing many practices on a statutory rather than voluntary footing, including making available proposals for the release of GMOs to the public and giving them a 60-day period for making comments (Article 7); and enhancing the public information principles and procedures (Articles 24 and 31). Other aims of the Directive were to increase efficiency and transparency of the decision-making process for the release of GMOs (Thornton 2000); harmonising principles of environmental risk assessment; providing mechanisms for licenses to be revoked if new evidence comes to light; consulting the public on experimental releases (determined on a national basis); and allowing the EC to appoint ethical committees of experts to report back on general matters and concerns. In terms of the remit for 'participation', this is restricted to being informed or consulted (able to "express an opinion"). Ethics committees have no statutory influence but may act in an advisory capacity, adopting an open and transparent process and making outcomes accessible to the public (CEC 2001).

Is the Current Regulatory Framework for GMOs and Level of Public Involvement Appropriate?

The above described regulatory approach may be regarded as appropriate, as it uses current risk assessment principles, initially treating GM crops in the same way

[6] Council Directive 90/220/EEC of 23 April 1990 on the deliberate release into the environment of genetically modified organisms. *Official Journal L 117*, 08/05/1990, 15-27.

[7] Directive 2001/18/EC of the European Parliament and of the Council of 12 March 2001 on the deliberate release into the environment of genetically modified organisms and repealing Council Directive 90/220/EEC - Commission Declaration. *Official Journal L 106*, 17/04/2001, 1-39.

as any other new crop. The question, however, arises whether GMOs should in fact be viewed as 'merely novel' or rather as 'radically new'. This distinction is important and helps characterise the fundamental differences in values and concerns expressed over the commercialisation of GMOs, and the quite different assumptions about their inherent risk and ability to be controlled (Davies et al. 2004). McHughen (2000: 7-8) encapsulates the different viewpoints when stating on the one hand "For the first time […] humans now have the ability to modify life in its most fundamental form"; and on the other "If we believe the 'suits' from the multinational corporations, molecular genetic technology is simply an extension of past, acceptable technologies and we have no reason to fear it". While the latter implies a routine technical matter which can be adequately assessed by the current regulatory approach, the former is likely to entail more radical changes and implications for sustainable development and hence should involve public participation through inclusive debate and decision-making procedures.

Generally, proponents of GMOs are ambivalent or play both cards (Davies et al. 2004: 3). Biotechnology companies, for example, on the one hand emphasise that the new developments are innovative and revolutionary, while on the other hand try to assure the public that these are based on tried and tested techniques and therefore present no new risks to society (framing a discourse like this could be seen as one example of latent power). Opponents to GMOs tend to emphasise the uncertainty over their effects on human health and the environment; the potential devastating effects on other agricultural production systems (especially organic farming) and existing power relations (e.g. between farmers and seed suppliers); and the fact that the genetic modifications in question would not take place naturally. Thus, the commercialisation of agricultural GMOs is seen as potentially transforming personal, social, and economic life in significant and manifold ways, and potentially causing irrevocable changes to the natural environment. Such predictions are of course difficult to make, though stakeholders and members of the public tend to refer to past experiences with other new technologies (e.g. nuclear energy) and substances such as dichloro-diphenyl-trichloroethane (DTT), polychlorinated biphenyls (PCBs) or chlorofluorocarbons (CFCs), that went through risk appraisal yet turned out to be much more difficult to manage and damaging than could have been predicted. Also, the potential occurrence of unexpected side-effects from using

substances in a way that would not have occurred naturally is used to press for a more precautionary approach to regulating GMOs. A good, and frequently referred to, example here is Bovine Spongiform Encephalopathy (BSE, popularly referred to as 'mad cow disease') which arose from meat and bone meal unknowingly carrying the scrapie infectious agent and which was being fed as a supplement to cows – naturally herbivores – and consequent development of Creutzfeldt-Jakob disease (CJD) in some humans. Based on these and other experiences, it is maybe not surprising that the public's trust in standard scientific risk assessment methods, governments and other regulatory institutions has waned. Assurances of apparent 'safety' are seen as meaningless, and demands for explicitly considering society's concerns and involving the public in technology assessment and appraisal are growing (ESRC Global Environmental Change Programme 1996, 1999; Green Alliance/ESRC Global Environmental Change Programme 2000; Joss and Belucci 2002; Pellizzoni 2003).

Decision-Making Powers and Remit

The current lack of public consultation and participation in the regulation of new and far-reaching technologies as well as environmental issues from an early stage has been widely criticised by many social scientists and NGOs and is being slowly addressed in more recent and currently drafted EC regulations. For example, one part of the WFD states the requirement of Member States to: "encourage the active involvement of all interested parties in the implementation of the Directive" (2000/60/EC Article 14.1). As with all EC directives, it is left to Member States how to interpret and put the European law into national legislation. Thus, statements such as 'active involvement' and 'interested parties' could be very differently interpreted and put into practice by different national or regional legislators, and each of them can choose different ways about implementing requirements.

Another interesting example is Norway which as a member of the European Economic Area (EEA) enforced the EC Deliberate Release Directives but, as not being a member of the EU, passed its own legislative framework: the Gene Technology Act (1993). The EU and Norway have received the same notifications for market release of GMOs, but assessed these according to their specific legislative context with quite different results. Norway includes in their assessment effects on

sustainable development, benefit to society and the context for producing the GMO (Green Alliance / ESRC Global Environmental Change Programme 2000). Largely due to assessing these wider criteria, Norway only approved 4 notifications, rejected 10, and 4 are pending, while the EU approved all of the same 18. Kvakkestad and Vatn (submitted) explain these differences with different value judgements regarding response to risk, uncertainty, ignorance, burden of proof and the extent and type of consequences to be considered. Put differently, the scale of the issue and hence its assessment is much more narrowly interpreted in the EC legislative framework than it is in the Norwegian case.

With regard to current EU laws and regulations of GMOs, a radical overhaul and change in assessment criteria are unlikely. Instead the focus is on complementing these with new legislation, such as food ingredient labelling and environmental liability. With the ratification of the Aarhus Convention (UNECE 1998), and the adoption of the Rio Declaration (UN 1992, especially Principle 10) and the Johannesburg Declaration (UN 2002, especially Point 26), the question, however, arises whether and to what extent should active and early public participation be institutionalised at the local, regional, national and/or international levels?

Institutionalising Public Participation

The development of new institutional structures alongside existing ones is a possible option; for example, creating a new committee, organisation or agency for public involvement (Green Alliance / ESRC Global Environmental Change Programme 2000). Expertise would be at hand to initiate and run participatory processes and communicate outcomes to decision-makers. Alternatively, a long-term national or international citizens' jury or laypersons' forum could be created, though it may be fair to describe the current decision-making system as reluctant to accommodate such direct public input. On the other hand, participatory processes could be integrated better into the current system using various instruments and techniques if the political will and vision exists. With regard to GMOs and responding to provisions under the Aarhus Convention, the UK Department for Environment, Food and Rural Affairs (DEFRA), for example, however, wish to remain on a conservative path of consultation rather than embracing active participation as they are "concerned …

about any proposals which went beyond the new Directive's [2001/18] provisions." (DEFRA 2004c: Paragraph 1).

In both cases, important factors would be how new instruments and structures would fit in with existing ones and affect their current mode of operation. Would they make already complicated multi-scale decision-making structures inefficient or even unworkable? Institutionalising participation may not necessarily turn out to be a good thing, as it often goes along with inflexibility and some even speak of 'trappings of institutionalisation' (e.g. Wynne 1995). Thus a key factor here would be to pick up on the spirit of any new policies or legislation on participation, and not just the letter.

Good communication and cooperation would be necessary between any new body or structures and existing decision-making agencies. Defining the expected and extreme boundaries of their remit and actual powers in influencing policy formulation and decision-making would be a delicate but crucial point of contest. Any formalised deliberations and outcomes of informed and inclusive public processes may be regarded as 'more bottom-up democratic' than the currently operating system with its periodically elected body of 'representatives' and associated civil service machine deciding on outcomes. The current challenge is whether existing decision-making bodies would be prepared (or could be politically challenged) to actually hand back some powers to the public and how the existing legal framework could be updated (or more radically overhauled). This of course will have to go hand in hand with allocating responsibilities for decisions; part of the current reluctance to open up decisions to more direct public involvement is that responsibilities, and thus the burden of a decision, lie solely with government and their agencies.

SCIENCE AND SOCIETY

Social Context of Science

'Science' as an institution crucially influences technological, economic and societal development and vice versa. Reviewing different research perspectives on the 'public understanding of science', Wynne (1995: 362), for example, states:

> "Claims about "the public" or "society" have long been embedded within scientific discourses, and there is a similar history of recurrent concern about public acceptance of "scientific" authority (Layton, 1973). Over the past

> decade or so, research in history of science has systematically exposed how the tacit rhetorical constructions of the social order help constitute scientific knowledge (Golinski, 1992; Shapin & Schaffer, 1985) and how this knowledge helps shape the social order, in processes of mutual construction of science and society."

This is in stark contrast to a commonly portrayed picture of science as being 'independent', 'objective', 'sound', 'neutral' or 'impartial' – where science is associated with facts, whereas society with values. As with the public, science is commonly referred to as a coherent body, yet in practice shows multiple facets and contrasting paradigms. Irwin and Wynne (2003), for example, "interpret both 'science' and the 'general public' as diverse, shifting and often-diverging categories" (p. 7). Also, they look at the notion of science not only in terms of 'scientific institutions', defined as bodies which fund, manage or implement science and technology, but also in the wider context of those institutions which use science "as a source of defence, legitimation or profit (for example […], the nuclear and food industries and the related government departments)" (ibid) and hence have a very direct link with societal affairs.

Scientists and Knowledge Identities

Some scientists perceive themselves and their work in distinct ways that do not make this link between science and society; this also highlights the importance of recognizing knowledge identities. Cook et al. (2004a, b), for example, used quantitative and qualitative approaches to study language choice and communication strategies between 'experts' and 'non-experts'. They analyzed 50 hours of in-depth interviews with GM scientists, non-experts and other stakeholders in the GM debate and summarize their findings as follows:

> "We uncover rhetorical devices used by scientists to characterize and ultimately undermine participation by non-experts in areas including rationality, knowledge, understanding and objectivity. Scientists engage with 'the public' from their own linguistic and social domain, without reflexive confirmation of their own status as part of the public and the citizenry. This raises a number of interesting ironies and contradictions" (2004b: 433).

Specific perceptions of the interviewed scientists include the following: First, GM scientists unhesitatingly grouped participants into the following groups: scientists, the public, and GM opponents. They saw themselves as a homogenous and unproblematic grouping, not counting themselves as members of the public, and no

distinction was made of varying degrees of knowledge, different areas of expertise or opinions among scientists (Cook et al. 2004b). Second, "Scientists with anti-GM opinion were regarded as in some way not proper scientists" (ibid, p. 447). Third, the "[u]se of the scientific method (which is taken as defining of science and 'scientists') is assumed to be known and used in the natural sciences only", ignoring, for example, the social sciences (ibid, p. 437). Fourth, the public are talked about in more passive terms, as ignorant about scientific facts and risks and described as emotional and easily influenced by anti-GM interests, and contrasted with the rational, thinking scientists. They thereby reduce relevant knowledge to technical knowledge (only certain facts are relevant) and postulated that only using that kind of knowledge can relevant claims be made. The (natural) scientists know these facts and how to interpret them. Scientific participants of this particular study hence refused to be reflexive about their own particular knowledge and viewpoint, and unwilling to engage with other frames, perspectives and knowledge; instead they felt themselves under siege and misunderstood.

Similarly, Carolan and Bell (2003), looking at the discourse about whether or not a power plant in Ames, Iowa, produces dioxin, observed the tactic of degrading discourse by those who contested the 'accepted' knowledge and social/power relations. Members of the public or opponents were portrayed as 'radical', 'crazy' or 'unsatisfiable', which "served to weaken the contesting networks of knowledge by bringing into question their epistemological orientations as being somehow inadequate or beneath the required level of cognition and scientificy" (p. 242). The overall aim of Carolan and Bell's paper about social relations of knowledge in an environmental dispute is to relate 'truth' back to 'trust' (based on Middle English). They argue that truth essentially depends on social relations and involves power, knowledge and identity. They argue, drawing on and developing Foucault's work, that "these social relations become constituted (and reconstituted) in particular moments of *phenomenological challenge* – discursive moments that confront the existing and social relations of knowledge and their dialogue of truth and trust" (p. 225-226). "Knowledge creates social affiliation, as well as social disaffiliation. The relations of knowledge identities constitute us as we constitute them" (ibid, p. 229). We connect ourselves to and support certain knowledges and associated history/present, and at the same time we forego or actively disconnect ourselves from

other social presents and futures. Insights from GMO participatory events seem to signal that society wishes to actively partake early on in defining what futures are preferred over others, as opposed to being guided (or manipulated) by specific interests of the current power status quo. Thus a stronger ongoing public deliberative element in democracy could redress some of the imbalances that have evolved from the current party political system with its strong focus on liberal market mechanisms.

Public Understanding of Science – Misperceptions

Insights gained from public participatory processes and other social science research relating to GMOs, and new technologies more generally, have helped highlight misperceptions by decision-makers and scientists about the public, as well as contrasting expectations and views of the functions and use of scientific knowledge in environmental decision-making.

Interviews and focus groups with GM stakeholders, scientists, and members of the public have shown that the public's readings of the issues at stake tend to be set within a wider historical, economic and political context. Their knowledge is usually based on experience of how policy matters play out over time and how public and scientific affairs are managed and communicated – these tend to be much more narrowly reported in the press (Cook et al. 2004a). Most members of the public are aware and readily admit that their scientific knowledge on specific subjects is poor, yet feel that they have relevant insights and perspectives to contribute (Wynne 1995; Marris et al. 2001; GM Public Debate Steering Board 2003). However, a common misperception is the assumption that if the public had a better scientific understanding, they would think differently.

This 'deficit model' (Wynne 1988; Michael 1996), has been tested on several occasions and findings show that once people had the interest and chance to learn more about scientific research on GMOs, their stance often hardened (i.e. stayed ambivalent or anti-GM) or became more cautious, rather than looking more favourably at the commercialisation of GMOs (Bauer et al 1997; Levidow and Marris 2001; Bucchi and Neresini 2002; GM Public Debate Steering Board 2003). Thus, the expected link between scientific knowledge and concern was not confirmed and

almost the reverse was found. Many also expressed a wish to see more research and monitoring carried out before any final decision is taken on the commercialisation of GMOs, as available knowledge appears very limited and outcomes from different research and field trials present a complex picture and contradicting evidence. While many would wish that additional research may remove current contradictions and supply clearer 'answers', members of the public seem also very aware that there is likely to always remain some uncertainty over the safety and benefits of GMOs (Marris et al. 2001; GM Public Debate Steering Board 2003). While scientific research is hoped to shed more light on (potential) effects of GMOs on the environment and human health, scientific findings are seen as only one aspect for guiding decisions and future development.

CONCLUSIONS

Participatory processes have been proposed as capable and necessary for environmental decision-making in the context of complex natural and social systems and improving linkages between society's different actors and networks. With participation being seen as a politically correct approach, there is a danger, however, that any type of involvement in any context is seen as good. Careful consideration of the underlying motives, timing and remit of stakeholder and public involvement in debating policy paths and contributing to decision-making is crucial. Similarly, the institutionalisation of participatory approaches needs careful and more explicit attention. If they are to be more than public debating forums or social learning exercises, participatory approaches require reflexive institutional actors and windows of opportunity to actually impact on decision-making and environmental management.

Politics and Power

There is an apparent lack of formalised structures for participation by civil society in the framing and decision-making of issues which are far-reaching and characterised by uncertainty and ignorance. The current institutional and legal footing of participatory processes has been shown to be one important factor in limiting their remit and impact. Processes are often commissioned on an ad hoc basis relatively late in a decision or evaluation process; and the regulatory context for involving the

public and stakeholders remains vague and unambitious. Wishful expectations of participatory processes are propagated (especially in terms of reaching 'consensus' or at least a compromise), yet insightful outcomes are ignored (e.g. wishing to reflect on food production systems and trade relationships more generally rather than merely taking a pro or anti-GM stance).

Considering the example of the commercialisation of agricultural GMOs, the remit of public and stakeholder participatory processes is largely based on voluntary agreements or statutory duty to consult. Several of these processes were of a deliberative nature, and some genuinely attempted to be inclusive. In that sense, we have seen several 'positive' processes but none with a 'positive' outcome, in the sense of actually having an impact on legislation, policies and management. As no formalised way exists of having to include outcomes of consultations and deliberations in the actual decision-making process and final decision, currently the most that can be achieved is an individually negotiated assurance of government to consider and respond to the outcomes. Decisions on GMOs are hence political. This raises questions as to whether participatory processes can and will substantially alter environmental decision-making or whether they merely serve as a front to placate disquiet voices. The allocation of decision-making powers, voice and influence are crucial here, especially whether some should be transferred back to the public rather than remain indirect via elections under the current representative democracy framework. Currently, and even with the institutionalisation of such processes, there is a danger that participatory processes are a mere formality, employed to 'educate' people, or used to legitimise decisions which have already been taken. Formal institutionalisation should not result in over-bureaucratisation and apathy, with decision-makers remaining sceptic and participants turning increasingly cynic. Instead, more consideration should be given to their role as part of an ongoing dialogue between scientists, stakeholders, decision-makers and civic society to reach more informed decisions in a more reflexive way, where reasoning powers replace bargaining powers.

Discussion or Decision

The instrumental use of participation as a decision-making tool has been propagated in situations where stakes and breadth of interests are high and considerable

disagreement exists. However, its role in informing policy discussions is often neglected. Public involvement in the GM debate has highlighted society's desire to identify and discuss relevant issues and concerns – in the broadest sense – at an early stage and for policy and decision-making processes to be more open and transparent. Such an inclusive discourse phase is currently missing. This supports Stirling's (in press; 2005) view which sees participatory deliberation as more appropriate to open up processes (normative and substantive perspective) offering pluralistic and conditional advice to policy-making. Such use would act as a catalyst for political debate and enhance accountability. It would also ease the demands on 'representation' as rather than trying to come up with one decision or outcome that represents 'the public's view', the final political decisions and associated responsibility would remain with existing decision-makers. The aim then is to change and improve the whole process rather than just the outcome. As scientific research is not by default a reliable and coherent source to guide decision-making, such opening up of the process would seem highly appropriate.

Changing Relationships

Relationships between scientists, society and decision-makers are partly and slowly changing. In the context of the GMO debate, the positivist (or 'narrow') science approach has been challenged for, amongst others, inadequately addressing complex issues. Instead, a 'critical' or sustainability science approach (Kates et al. 2001; Gallopin et al. 2001) which openly acknowledges a plurality of legitimate perspectives and values and the need for extending the policy formation process has been highlighted. In accordance with Irwin and Wynne, findings suggest that science should "not be presented as a simple 'body of facts' or as a given 'method'; but as a much more diffuse collection of institutions, areas of specialised knowledge and theoretical interpretations whose forms and boundaries are open to negotiation with other social institutions and forms of knowledge" (2003: 8). While narrower, 'standard' scientific approaches have their particular role to play in scientific research and progress, dealing with increasingly complex and potentially irreversible environmental issues has, however, also put demands on the scientific community and their institutions to adopt approaches that reflect the wider public concerns and redefine the boundaries of what counts as relevant knowledge. Public participatory

processes certainly have challenged how scientists address and account for uncertainty, and what governments take into account for long-term decision-making.

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