

PDF hosted at the Radboud Repository of the Radboud University Nijmegen

The following full text is a publisher's version.

For additional information about this publication click this link.

<http://hdl.handle.net/2066/46439>

Please be advised that this information was generated on 2021-09-28 and may be subject to change.

Radboud University Nijmegen

Maria Hage, Pieter Leroy, Elmar Willems

**Participatory Approaches in Governance
and in Knowledge Production:**

What Makes the Difference?



Working Paper Series 2006/3

Nijmegen, March 2006

Participatory approaches in governance and in knowledge production
What makes the difference?

Maria Hage, Pieter Leroy, Elmar Willems

Department of Political Sciences of the Environment

Nijmegen School of Management

Radboud University Nijmegen

ISSN 1570 – 5501

Contact information:

Thomas van Aquinostraat 3

P.O. Box 9108, 6500 HK Nijmegen, the Netherlands

Phone: (+31/0) 24 3611925

Fax: (+31/0) 24 3611841

m.hage@fm.ru.nl

p.leroy@fm.ru.nl

e.willems@fm.ru.nl

Foreword and summary

This paper has been presented at the 2005 Conference “Environment, knowledge and democracy”, sponsored by the RC24 of the ISA (Environment and Society Research Committee of the International Sociological Association), on 6-7 July 2005 at the Faculty of Sciences of Luminy, Marseille, France.

It embarks on the theme of ‘participation’ under conditions of ‘uncertainty’ in current sociological discussions. It indicates the parallel but distinct development of participatory approaches within the attempts to solve ‘intractable’ policy problems on the one hand and within knowledge production on the other. The central question we raise, but which seem hard to answer, is whether these innovative practices and procedures meet the claim of enhancing the quality and legitimacy of knowledge production and policy making. To identify the components that may be used within an evaluative framework for participatory approaches in knowledge-extensive environmental policy-making, we first sort and qualify the literature on participatory governance, secondly, we sort and qualify literature on participatory knowledge production, and thirdly, we outline the state of the art in an empirical sense. We conclude with some remarks on the need for an evaluative framework for participatory approaches that focuses more on the actual impact and change in the political context.

1. Introduction

Over the last years ‘uncertainty’ seems to be a central concept of debate. This debate comprehends sociology and political sciences, environmental studies, science and technology studies, while increasingly transgressing the boundaries between those spheres and domains. Whatever its precise meaning, ‘uncertainty’ refers to the fact that contemporary society faces increasingly complex problems that, by their very character, seem to be beyond the problem resolution and management capacities of well-established ‘modern’ institutions such as politics, science and technology.

These complex problems and the uncertainties that result from them are largely unforeseen effects of modernity. Consequently, complexity and uncertainty do not restrict to environmental issues, but pervade into all spheres of society. Complex and uncertain environmental threats are but a part of generalised social risks that encompass politics, economics and culture, in a world said to be increasingly globalising, individualising, multi-layered and multi-interpretable.

One of the indicators of uncertainty often referred to is the increasing lack of legitimacy of modern institutions in politics, science and technology. In accordance with Beck’s ‘risk society’ concept, Healy describes contemporary society as one in which ‘the condition of heightened urgency, risk and uncertainty as propelled by the uncontrollable technological innovation, has led to a loss of trust in both science and institutions as credible authorities to cope with stress’ (Healy 2001: 41). It is precisely their perceived lack of steering capacity and performance that makes politics and science vulnerable, as they suffer from a loss of confidence. As Wynne (1996) pointed out, this lack of legitimacy is largely latent and invisible, but very active or even explosive at times. The latter is particularly the case as technology failures or shortcomings become evident (nuclear waste), as science cannot solve or undo certain problems (from BSE to GMOs), and as politics do appear unable to deploy effective and accepted strategies (in the case of climate change, global inequality and the spreading of nuclear arms, for example). Science, technology and politics seem to have lost credibility and authority, giving rise to a mix of distrust, protest and alternative problem-solving strategies.

In an attempt to regain ground, we witness the emergence of participatory approaches all over the place. It seems audacious to link them, but the more or less simultaneous emergence and diffusion of new forms of (participatory) governance in different policy domains and in politics altogether, and of participatory technology assessment and knowledge production cannot be mere coincidence. First, we believe they respond to the largely similar problems these different spheres face: problems of (a lack of) steering capacity, performance and legitimacy as evoked above. Secondly, these newly emerging participatory approaches are advocated with largely similar arguments. Two arguments recur: participatory approaches, firstly, are said to contribute to better informed decisions and processes, and

thereby improve the *quality* of steering efforts, as they take on board a multitude of stakeholders' perspectives, including lay and local knowledge that has been overlooked hitherto. Participation, secondly, would contribute to more *legitimate* decisions and processes, as participation is presumed to foster increased levels of acceptance during the respective phases of policy-making and knowledge production. A more participatory approach towards problem-definition should lead to enhanced input-legitimacy - i.e. the extent in which all stakeholders are enabled to have a say in what is/ should be at stake -, whilst it also should lead to a better implementation of decisions, or more output-legitimacy - i.e. the extent in which solving strategies are carried out and supported by the affected parties -. Both arguments are normative in nature, as they advocate and presuppose a further step in the perpetual quest for (new forms of) democracy. In short, participatory approaches are said to contribute to overcome the shortcomings and failures of modern institutions, while canalising uncertainty and repairing the lack of legitimacy.

Participatory governance has been substantiated by an elaborate normative framework and has found partial resonance in a range of societal experiments and innovative practices. This paper tries to look at these efforts from some distance and asks itself what efforts have been made to assess what difference these participatory initiatives, methods and strategies make. Thereby we will not attempt to give definite answers to what extent participatory initiatives really lead to a better understanding, to more legitimacy and to a greater steering capacity. Rather, it outlines how most assessments are engaged with the methodological aspects of participatory initiatives, and how qualitative and impact-related evaluations are less dominant. This will be explained in the concluding section 4.

This paper starts with a brief exposé on the debate on participatory governance, in an attempt to classify a variety of approaches and assessments (section 2). It then moves onto the debate on knowledge production and uncertainty, and the role of participatory approaches therein (section 3). As we deal with knowledge-extensive processes of environmental decision-making, section 3.4 focuses on examples of participatory approaches that permeate both processes of political decision-making as well as knowledge generation. This category of participatory approaches wherein (environmental) decision making, by purpose, is paralleled with a process of information gathering and knowledge production, either within a local, national or even European context, serves to illustrate the final points in our conclusions.

Our interest in a critical review of participatory approaches draws upon our earlier writings on participation (Leroy 2002; Van Tatenhove and Leroy 2003), on recent developments in environmental politics (Van Tatenhove, Arts and Leroy 2000) and on environmental knowledge (Turnhout and Leroy 2004). At the same time this paper outlines some of the basic considerations of two research-projects on environmental governance and participation in circumstances of uncertainty. The first one is carried

out by Elmar Willems and investigates the dynamics of shifting and conflicting conceptions of scientific knowledge in socio-environmental controversies, starting with the nuclear energy debate in the seventies. It thereby gives specific attention to the environmental movement as an important protagonist of new forms of knowledge production and new relations between science, society and policy-making. The second project, carried out by Maria Hage, is entitled 'participation in knowledge production under conditions of uncertainty' and is funded by the Netherlands Environmental Assessment Agency (MNP/RIVM). The aim of the project is to develop a guideline on stakeholder participation for the Agency, respectively for the organisation of participation within the processes of its environmental reporting.

2. Governance and participatory approaches

2.1 Governance: a short introduction

The character of contemporary policy-making and societal approaches to problem-solving in general increasingly is described by the concept of 'governance'. This concept has been used to denote a wide variety of principles and practices, ranging from household management to global regime formation. We will not repeat the different versions and connotations of the concept here (see Rhodes 1997; Van Kersbergen and Van Waarden 2004; Kooiman 2002: 71-73), yet we believe that this polymorphic and multifaceted character of 'governance' is part of its success. To account for the widespread adoption of 'governance - and of 'participatory governance' in particular, that we will turn to in more detail hereafter -, is to point to the *flexibility and multi-interpretability* of the concept combined with its *capacity to unite* those with a minimum commitment to solve policy-problems(cf. Hajer 1995).

In general, governance approaches are said to challenge 'many of the assumptions of traditional public administration' (Stoker 1998: 18). First, they are regarded as a way out of hierarchical led intervention and failures associated with top-down co-ordination; consequently, they propose more horizontal forms of governance, such as interaction and dialogue among network parties, partnerships, self-governance and similar mechanisms. Second, they imply a shift in the locus of democratic politics: from constitutional politics to politics outside traditional frameworks and institutions, from national to either subnational and supranational levels (Van Tatenhove and Leroy 2003). Yet these two developments do not imply the abolishment of 'government' (cf. Pierre 2000), rather do they represent the increasing juxtaposition of government and governance practices. Governance thus refers to a gradual transformation of the political domain where the formulation of goals, the choice of instruments and the implementation of solutions becomes a combined task of political actors and institutions, corporate interests, civil society and transnational organisations. Some scholars suggest that the state has become an adaptive entrepreneur that performs several roles at the same time. It commands, controls, regulates and executes, while it increasingly has to deal with the complexity, diversity and dynamics of modern

societies and therefore more and more interacts, co-operates, co-ordinates and facilitates. It demands a 'governmentality' or a political style that can best be described by the principles of a 'reflexive rationality' (Theys 2002; Jessop 1998): this would include the ability to respond in a creative and flexible manner to problems of governance, a willingness to learn on practical and institutional level and the stimulation of normative debates on the principles underlying all governance activities (see Kooiman 2000; 2002).

2.2 Participatory governance and the environment: between empirical phenomenon and normative ideal

The quest for such a reflexive 'governmentality' resulted in a variety of participatory strategies and projects, among others in the environmental field. Despite their differences in scale, issue, design, stakeholders involved, outcome and level of success, we label them as 'participatory (governance) approaches' here, while restricting to environmental issues. In this section we develop a typology of analyses, aiming at a clarification of the strands of literature. Section 2.3 then will range and structure the way(s) participatory governance approaches have been assessed with regard to their contribution to steering capacity and legitimacy issues.

According to Theys (2002), and despite initial strategies of traditional and hierarchical means of intervention and regulation, the environment has played an *avant garde* role in the modernisation of forms of governance. The plenitude of 'innovative' forms of environmental governance is generally captured by terms as 'deliberative', 'discursive' or 'participatory', and a lot of these projects have been investigated, in a series of single or multiple case studies, by a series of scholars, resulting in a mass of publications. Table 1 tries to summarise this literature by classifying the *sorts* of analysis that prevail with regard to participatory environmental policy-making (in modern industrialised countries). In our view, the approaches in literature differ according to two axes:

- the *level* of analysis, where a conceptual approach is set against a more empirical one, and
- the *mode* of analysis, ranging from a descriptive to a prescriptive or normative approach.

By combining those axes in a matrix, 4 boxes are created that serve to unravel the existing literature. Of course many authors are not and cannot be captured by reference to a single box. The proposed lines of division refer to a continuum, rather than to an absolute classification.

The upper boxes comprise empirical approaches, i.e. analyses that take specific participatory practices as a point of reference, either to present them as such (how it *is* done) or to comment on them in a normative way (how it *should be* done). Participatory governance in the latter approach leads to a number of formulas, recommendations or into a toolbox for more legitimate and more effective proc-

esses of participation. These latter efforts usually aim to describe what instruments could be used and what criteria should be fulfilled to enhance the quality and legitimacy of decision-making procedures (Joss and Bellucci 2002; Kasemir et al. 2002)¹.

Mode of analysis	<i>Descriptive</i>	<i>Prescriptive (normative)</i>
Level of analysis		
<i>Empirical</i>	Reports on experiences with participatory practices and procedures in environmental governance, on local, national or supra-national level	Formulate suggestions, recommendations for practices. Provide a toolbox 'how to' techniques for participation
<i>Conceptual</i>	Characterize and explain trends in governance. Consider participatory governance within broader processes of socio-political change	Provide normative (meta) principles for participatory governance. Generally according to the Habermasian ideal of 'communicative rationality'

Table 1: Four types of analysis of participatory environmental governance

The lower boxes refer to more conceptual approaches and usually describe participatory governance as a discourse or a concept. As these analyses go beyond specific practices, they identify the general characteristics of governance responses to complex problem-solving in modern societies. Kooiman (2002) provides one of the most elaborated accounts on governance in general. He distinguishes between first order, second order and meta-governance. First order governance comprises the 'day-to-day activity of public and private actors in concrete governing situations' (Kooiman 2002: 86). Second order governing focuses on the design of adequate institutional structures which should precede and enable participatory problem-solving by establishing a reliable set of rules, instruments and resources. Third-order or meta-governance concerns 'the governing activities aimed at the broad principles that concern the way governance itself, either first or second-order, takes place' (Ibid.).

Most empirical studies (upper boxes) deal with first and second order governance, the first referring to the projects, the second to their institutional context. When authors explicitly aim to engage with third order or meta-governance, they may formulate the very principles and basic concepts of participatory governance, either in an analytical or a prescriptive way (lower boxes). For instance, Keohane is pre-occupied with the building of appropriate institutions for global governance that are both legitimate and effective fora for the negotiation and formulation of policies. He thereby engages with a normative analysis of global institutions based on a Habermasian line of thought that outlines how 'voluntary co-

¹ See for an overview of empirical cases and the operational design of citizen participation projects Lyn Carsons' website <http://www.activedemocracy.net/> and the publications of the British Institute for Public Policy Research (<http://www.ippr.org.uk/>).

operation based on honest communication and rational persuasion provides the strongest guarantee of a legitimate process' (Keohane 2002: 263).

In summary, two core characteristics may be identified. First, literature on participatory approaches commonly refers to a democratic or legitimacy deficit as forms of accountability in classic institutional channels of representation no longer suffice in the dynamic age of complexity and diversity². For many authors, participation has become an imperative in a context of 'deep uncertainty' (Pellizoni 2001; Boudourides 2003), 'unstructured environmental policy problems' (Hisschemöller and Hoppe 1996; Bulkeley and Mol 2003) and a general 'decline of governability'³. In other words, they refer, implicitly or explicitly, to the issues of (lacking) steering capacity and legitimacy in an age of uncertainty, as we referred to in the introduction. Participatory governance is regarded as a remedying tool and strategy to overcome these problems of '(un)governability'. Therefore, participatory governance or 'deliberative democracy' as referred to in this paper and proposed by many theorists (Hajer and Wagenaar 2003; Pellizoni 2001, 2003; Grote and Gbikpi 2002) is the most desirable way to tackle the democratic deficit of traditional and hierarchical policy structures.

Secondly, literature on participatory approaches is primarily concerned with questions of legitimacy, and with an improved level of effectiveness through greater legitimacy. As such, it advocates a strategy that clearly differs from problem-solving strategies that make reference to neo-liberalism and market logic, which foresee to apply the criteria of efficiency from the neo-liberal economic domain to society and policy domains. Having said that, literature on participatory approaches is ambivalent with regard to the emergence of public-private and private-private partnerships as means of problem-solving. The actual contribution of partnerships all together and the circumstances under which they can fulfil the ambitions they have been ascribed needs further empirical research (as will be carried out in the Utrecht-Nijmegen research Programme on 'Partnerships for sustainable development', UN-POP).

2.3 Participatory governance for the environment: between reformist suggestions and radical pessimism

From our classification of literature we conclude that most authors have a normative commitment to democratising environmental governance as they signal a need to move away from hierarchical or market-led governance, and sketch the outlines for new deliberative modes of governance (see for

² A sophisticated account on the characteristics of society in the sense of systemic complexity, diversity and dynamics can be found in Kooiman 2000.

³ Kooiman 2002 and Theys 2002 consider 'governability' as the ultimate yardstick for evaluating governance approaches. It refers to the intrinsic qualities of specific situations and the extent in which these qualities can be influenced, altered or managed (cf. Theys 2002: 218). For example, the governability of environmental problems

example Gbikpi and Grote 2002; Pellizoni 2003a/b; Lebessis and Paterson 2000). Recently, though, we see a growing interest from both empirically and theoretically minded scholars to critically assess these new forms of governance in relation to citizenship, to legitimacy and to the wider socio-political context⁴. In short, there is a growing body of literature that pays attention to possible participatory governance *failure* (cf. Jessop 1998: 38; Jessop 1999).

Such critical examinations may, however, arrive at different conclusions dependent of course on the examples, on the area of study and, beyond these empirical issues, on the criteria that are being used. Consequently, there is no general answer to the crucial question whether (the experiments organised hitherto with) participatory governance should be regarded as successful and effective, or ineffective and wasteful (Irvin and Stansbury 2004). Given the ever broader array of participatory practices in very different fields - even when restricting to 'environmental' issues - and given the lack of consensus on the criteria, we will limit here to sort out the types of criticism being raised.

For analytical purposes, we distinguish between approaches that lay emphasis on operational, organisational and procedural aspects of participatory initiatives and those that consider the institutional and political context to be crucial for effective participation. Thus, assessments of participatory governance arrangements depend upon two sorts of evaluative considerations:

- A positive or negative assessment of the quality of the *participatory design*, or the responses on questions such as: to what extent are the participatory mechanisms under consideration in fact able to engender inclusion, mutual understanding and co-operation? To what extent do they connect to the problem-situation at hand? To what extent is the design (consensus meeting, referendum, public debate, citizen juries and others) adequate for the issue at stake and under the given circumstances? In other words, one aims to assess the intrinsic features of a participatory design in relation to its purpose.
- A positive or negative assessment of the contextual conditions, or the responses to the question to what extent the existing contextual and structural factors constrain an effective implementation or altogether complicate the invocation of innovative participatory approaches.

Table 2 presents four possible answers resulting from the combined assessment of the participatory designs on the one hand and of the conditions of implementation on the other. Again, the four boxes

has decreased as they have been progressively characterized as less and less structured, and more and more difficult to solve (see Blowers and Leroy 1996; Held et al. 1999).

⁴ In environmental governance, there has been considerable discussion on 'collaborative' or 'participatory' planning analysis (see Healey 1997, 1998; Pløger 2001; Keller and Pöferl 2000; Sharp and Richardson 2001; Yearley et al. 2003; Flyvbjerg 1998; Smith and Wales 2000; Irvin and Stansbury 2004; Spash 2001). In the field of Participatory Technology Assessments, see the ADAPTA project (Joly and Assouline 2001) and the EUROPTA research project (Klüver et al. 2000; Joss and Bellucci 2002). A critical assessment of 'social movement agency' in global environmental governance may be found with Arts (2005, forthcoming) and Ford (2003).

do not represent absolute stances. In fact, positions in the debate are very much nuanced and tend to consider both weaknesses and strengths with regard to both processes and context. Nevertheless, some authors will be referred to by using this typology. It might be clear from the table that the box at the upper left represents a rather optimistic, the one on the bottom right a radically pessimist view.

<i>Quality of participatory design</i>		
<i>Conditions of implementation:</i>	+	-
<i>Moderate barriers to the implementation of participatory designs</i>	<p>I 'Right direction!' Participation processes function relatively well. Societal/ political hurdles may have to be overcome, but relatively optimistic about possibility to implement them</p>	<p>II 'Procedures' Due attention to design of methodologies and consequent 'right' invocation of discursive techniques; assumes more or less favourable conditions for implementation</p>
<i>Substantial or structural (institutional, epistemological, power related) barriers</i>	<p>III 'Politics' Lack of political will to ratify deliberative approaches due to structural barriers; no clarity on status of deliberative processes in political decision-making.</p>	<p>IV 'Power' Habermasian deliberative practices are naïve in a Foucauldian reality. Persistent power relations present structural barriers to a proper implementation and invocation of participatory designs.</p>

Table 2: Four critical approaches to participatory governance (adapted from Theys, 2002: 234-236)

The 'right' direction! (I)

Drawing upon the ideal of Habermasian 'uncoercive communicative practices', Healy (1997; 1998) can be regarded as one of the main advocates of 'collaborative' and 'deliberative' planning activities in environmental governance. Based on extensive study, she sees opportunities for commonly motivated stakeholders to arrive at mutually binding win-win situations based on 'inclusive interactive strategy building'. Her optimistic view on 'good practices' in collaborative planning is hardly tempered by institutional constraints, although '(...) it is clear that the evolution of 'good practice' in collaborative planning is not just a matter of the capability and commitment of those involved in particular practices. Its possibility is encouraged or constrained by the institutional context' (Healy 1998: 16). And indeed, the 'evolution of multi-stakeholder collaborative planning (...) is (...) severely constrained' (Healy 1998: 17). But she simultaneously expresses the hope and expectation that considerable transformations of the current system will take place.

Procedures (II)

A considerable amount of literature pays attention to the proper design of participatory processes and methodologies, with only moderate reference to institutional 'maladjustments' that may hinder their gradual institutionalisation. Convinced of the potential of these participatory procedures, critical ob-

servers see it as their task to enhance the methodological quality of participatory governance by structuring fertile discussions (Goodin and Niemeyer 2003), and context tailored processes (Richards et al. 2004). This also involves the selection of participants, the solving of representational issues, linking the deliberation process with decision-making (the relevant institutions have to respond to recommendations) and a proper ‘timing’ of the discursive process (Hage 2002), in short, an adequate process management (Holländer and Leroy 2001). Of course questions of institutional context are raised (see, amongst others, Smith and Wales 2000), but this is not given a negative connotation as it would obscure all possibility of effective implementation.

Politics (III)

The positions taken in boxes III and IV differ fundamentally from the upper boxes as they assume that structural or substantial barriers are, on purpose or not, put up by the existing political establishment. These barriers may be institutional (reliance on bureaucratic procedures), epistemological (reliance on expertocratic or technocratic forms of governance, without proper consideration of innovative ways of knowledge production – see next section) and/or power related (interests based politics). This may result in a pessimist view on the possibility to change decision-making structures and break political interests that have long dominated the field of environmental decision-making.

For example, it is generally observed how EU sponsored initiatives fail to encourage ordinary citizens to become more active, or ‘to create the conditions for the exercise of citizenship’ (Magnetite 2003: 152). Due to complex procedures of decision-making and institutional barriers, the tendency to dissolve ‘political issues’ into ‘technical problems’ and a limited interpretation of ‘participation’ to a form of *consultation*, it is hardly expected that other than already organised groups will be a part of participatory governance. Above all ‘creating a clear deliberation of European issues, which could generate public interest, is not so much a question of institutions as a problem of political attitudes’ (Magnetite 2003: 157).

Power (IV)

For Pløger (2001), a renewed ethics of participation and democratic communication is highly desirable, but very hard to attain. The Habermasian ideal is confronted with the ‘real life’ power-related view of Foucault: his analysis shows how participatory environmental governance and planning has to deal with institutional barriers, with the power of planning rhetoric and with political and economic interests, that misuse participatory initiatives to disguise illegitimate and top-down practices. The Habermasian assumption that sincerity, comprehensibility, legitimacy and truthfulness of arguments are accepted as moral guidelines for ‘uncoerced reason’ tend to leave out the possibility of disagreement, the consolidation of groups of power and conflicts of interests. ‘And if real democratic, uncoerced, and consensus-oriented communication – which can satisfy the universal principles of the

Habermasian discursive ethic – does not fall short of the legal system of power, it definitely falls short of rational planning, because it is a time-consuming, inefficient, irrational, and conflictual process’ (Pløger 2001: 239).

2.4 In summary...

So far we have presented the emergence of participatory governance as an answer to the ‘ungovernability’ of complex problems. In a context of uncertainty, a lack of steering capacity and a lack of legitimacy, participatory approaches are expected to contribute to restore trust and legitimacy. Although scholars differ in the (descriptive-prescriptive or empirical-conceptual) perspective they use, there seems to be an overall consensus on this interpretation. At the same time, more critical comments have been uttered. While scholars laying emphasis on the design of participatory processes tend to be reformist, those emphasising the political context tend to be more pessimistic.

Within this broader scene of participatory approaches, their analysis and their assessment, we turn now to a more specific point of view. Some scholars indeed argue that traditional practices of policy making and government not only have been discredited by a lack of steering capacity and legitimacy, but that uncertainty itself represents a fundamental epistemological criticism and challenge (Irwin 1995; Pearson 1998). One of the cornerstones of policy-making in our (‘simple’) modern societies has been the uncritical treatment of science and expert-knowledge in relation with policy-formulation. But science itself suffers from a lack of legitimacy, and in the light of the BSE-crisis and others, ‘sound science’ has now become a hollow phrase, except for those who hold science as the sole source of legitimate knowledge (Torgerson 2003: 120; Taylor 2001). Many acknowledge the limits of the ‘traditional’ way of knowledge-production and its intimate and uncritical relationship with decision-making and aim to contribute to a reformulation of principles and practices of scientific knowledge production and its interrelation with policy making. We elaborate on those critics and proposals in the next section.

3. Participatory approaches to knowledge production

3.1 Knowledge production

Knowledge is a crucial resource for policy-making. As a consequence the production and utilisation of (applied or applicable) knowledge is an issue of prior concern, in particular in modern, largely expert-driven western societies. Nevertheless the classical, so-called ‘two communities’ view on the relation-

ship between science and politics suggested a clear and sharp demarcation of tasks, in which policy makers asked for useful information with experts, to which request experts responded with valid, reliable and useful knowledge, which the policy makers in turn were assumed to build upon. The adage 'speaking truth to power' (Wildavsky 1979) to express the role of scientists does reflect the different worlds or communities scientists and politicians were assumed to live and work in. These communities were said to have quite different ambitions and goals, different drives and rationales, different responsibilities and different systems of quality control.

From the early 1980s Gieryn launched and elaborated the concept of 'boundary work' (Gieryn 1983). Instead of a clear demarcation of two communities, the concept assumed that the boundaries between science and knowledge are permanently established and blurred, named and redefined, claimed and ignored. While it is true that science and politics are different worlds, with different values and standards, these boundaries are neither principal nor given, but socially constructed and contingent. Boundary objects (concepts, problem definitions, models, standards a.o.), boundary workers (scientific advisers, experts a.o.) and boundary institutions (advisory boards, scientific committees a.o.) do play a pivotal role in an ongoing process of construction, deconstruction and reconstruction of the boundaries between science and policy.

The environmental issue, among many other fields, clearly demonstrates the untenability of the 'two communities' view. As of their very emergence, the environmental issue and the development of environmental policies were predominantly influenced by scientists, as they provided the analyses, the models, the standards and the goals, and contributed also to the instrumentation and organisation of environmental policies. In other words, scientists clearly crossed the assumed boundary with politics and affected the latter - in many cases without being held responsible -. Environmental policies are largely expert-driven, if not technocratic, and clearly reveal the actual intertwining of science and policy-making. Gieryn's concept therefore provokes a series of empirical questions on how boundary work actually works, how it does combine the (often contradictory) claims and requests from either side, and how boundary workers or science-policy entrepreneurs do their job - and are held responsible for it -.

These are not merely academic questions, by the way. Over the 1980s and 1990s, the environmental policy domain gradually became the example *par excellence* of some paradoxes and questions on the science-policy interface and interaction, questions raised by both academics and societal groups. Scholars from Science Studies, from Policy Sciences and from Environmental Studies (cf. Jasanoff 1990, Irwin 1995 and many others) increasingly asked two (strongly interrelated) main questions. On the one hand, as the actual impact of scientists and experts grew, the question emerged as to 'who is actually speaking to whom?'. In 'The Fifth Branch' Jasanoff (1990) pointed at the important but

largely unseeable and uncontrollable role of experts and advisers - as boundary workers -. The functioning of expertise was increasingly questioned (Roqueplo 1997, Wynne 1996, a.o.), and gradually pulled along other questions: on the claims of expertise and science itself, and its monopoly as the exclusive provider of the 'truth'. Political and organisational questions thus metamorphosed into epistemological ones. On the other hand, as environmental scientists increasingly faced complex problems, risks and uncertainties, questions raised as to 'what is the quality of the scientific knowledge that our policies are based upon?'. Issues such as nuclear energy (in the 1970s), acid rain (in the 1980s) and climate change (from the 1990s onwards) were emblematic for the growing and ever more critical questioning of the role and quality of scientific information in environmental policy-making. Some major incidents and issues, such as Tsjernobyl, BSE, GMOs and others largely contributed to a growing distrust among the general public, giving rise at societal protest of different sorts (Irwin 1995, Wynne 1996). In brief, here we witness epistemological and methodological questions gradually metamorphose into organisational and political ones.

In other words, parallel to what was the case with traditional government, traditional forms of knowledge production and utilisation in policy-making were increasingly questioned in terms of their quality, their problem solution capacity and their legitimacy. And these questioning in turn gave rise to a quest for new, more transparent and more participatory modes of knowledge production and utilisation. In the next section we give a brief overview of some literature on knowledge and uncertainty, related to environmental issues, and resulting into suggestions and procedures for a more participatory approach. The penultimate section then pays attention to some empirical cases of participatory knowledge production, and tries to set out a frame of reference for their assessment.

3.2 Knowledge production: a quest for new practices

As stated in the introduction, the characteristics of many environmental problems are a real challenge to classical scientific knowledge - and its (assumed) traditional relation to politics -. Issues such as nuclear energy, climate change, GMOs and biodiversity are (1) highly complex issues, and therefore do urge for unusual multidisciplinary co-operation, (2) global issues, and therefore need to be analysed in their (unequal) consequences all over the globe, (3) long-term issues, and thus presume the availability of encompassing and very lasting systems of monitoring, (4) include irreducible uncertainties, and therefore ask for the application of the precautionary principle, and (5) do have unequal social impacts, do imply social, economic and political controversies, and thus appeal for a systematic dialogue between science, society and politics (cf. Blowers and Leroy 1996).

The question how to deal with these characteristics, both in terms of knowledge production and in political terms, and with regard to the science-knowledge interface is a question many scholars are

dealing with. Recent literature on the issue is overwhelming, starts from epistemological, political, organisational and other perspectives, and addresses a variety of issues. We restrict to three main approaches here, starting from an epistemological, an organisational and a normative point of view respectively. By distinguishing these three approaches we opt for a very restricted sample out of an overwhelming offer, and yet we believe these three to be largely representative for the debate. Some of the issues at stake are: the quest for the generation of knowledge that acknowledges its own frontiers and uncertainties, the quest for more legitimate knowledge, the quality control of this new sort of knowledge, the organisation of more applicable knowledge, and the inclusion of non-scientist expertise.

Post-normal science

Funtowicz and Ravetz (1992, 1993) are most explicit in their characterisation of environmental issues, as they label them as problems in which “facts are uncertain, values are in dispute, stakes are high and decisions may be urgent” (Funtowicz & Ravetz 1992). Facing such issues policy-makers ask urgently for certain and objective knowledge - “solving the scientific puzzle” -, that science however is not able to produce. In many instances, Funtowicz and Ravetz argue, we are under the condition of “soft facts and hard values”(Funtowicz & Ravetz 1993: 739-755). In such circumstances of intrinsic scientific uncertainties and high political stakes, we are beyond the capacities of ‘normal science’ and of ‘applied science’, where science derived from textbooks should be complemented by other ways of understanding, by other forms of knowledge and expertise.

Therefore Funtowicz and Ravetz (1993) developed the concept of ‘post-normal science’, which can be characterised as science where the traditional fact/value distinction can not be maintained. Post normal science is the case when “ facts are uncertain, values in dispute, stakes high and decisions are urgent.” Under the conditions of soft facts, hard value-related decisions must be made. This asks for the involvement of non-scientific knowledge and the use of post-normal methods of thought and reasoning. As traditional methods of scientific quality assurance do not work out under those circumstances, quality assurance is one of the major challenges of post-normal science. Funtowicz and Ravetz suggest ‘extended peer communities’, who “deploy ‘extended facts’ and take an active part in the solution of their problems” (Ravetz 1999:647). Participants of these ‘extended peer communities’ can be all kind of stakeholders of the policy process that can contribute with their local, environmental or sectoral knowledge.

As post-normal science thus clearly includes the idea of involvement of non-scientists, it appeals upon a participatory approach to enhance both the quality and relevance of scientific knowledge. At the same time Funtowicz and Ravetz do not offer operational indications as to how to organise post-normal science, how to assess and assure its quality etc. (cf. Van de Kerkhof and Leroy 2000). Their main

concern is about qualifying an epistemological issue, rather than providing an organisational or practical toolbox to respond to it. In terms of Table 1 (section 2.1) they provide a primarily prescriptive framework of analysis and design, without however formulating clear cut suggestions about how to process and to organise.

Mode II knowledge production

When launching the idea of a ‘new modes of knowledge production’, respectively ‘Mode II knowledge production’, Gibbons et al. (1994) did not have the environmental issue at the forefront, nor did they want to address an epistemological issue. When looking at a series of political, technological and economic problems and issues of contemporary society, one of which was the environment, they established that the success or failure of the way they were tackled, largely depended upon the organisation of the knowledge infrastructure. Biochemistry, computing science, life sciences and other fields they pointed at, seem to have more or less similar modes of knowledge production, that clearly contrasted the former ones (Mode I) (Gibbons et al. 1994). Mode I knowledge was - and still is - produced in a monodisciplinary way, institutionalised in huge universities or similar in research institutes, steered by rather inflexible long-term programmes, controlled in a hierarchical way, and largely academic in substance and output. The new mode of knowledge production, of course, contrasts with these characteristics, as it is defined as:

- multi- or even transdisciplinary, the latter referring to the involvement of non-scientist actors
- generated in a context of application
- produced in a diversity of sites, in virtual or even ephemeral networks
- highly flexible and reflexive and
- steered by novel forms of quality control (Nowotny et al. 2005 forthcoming).

The latter point is quite similar to the extended peer review asked for by Funtowicz and Ravetz. Their arguing also is similar, as Gibbons and colleagues claim that the real quality test for scientific knowledge lays outside the laboratory, and does include the societal and political approval of findings, of results and of their very implementation. That means that, apart from its testing on validity and reliability, knowledge should also be tested upon its ‘social robustness’. By introducing this concept, Gibbons c.s. imply an important procedural turn in the quality assessment of scientific knowledge, including the involvement of representatives of non-scientists, respectively of civil society.

Gibbons et al. (1994) emphasise the organisational aspects of knowledge generation, in particular the need for co-production thereof by all stakeholders included. Though they do not provide operational procedures either, it is clear that the idea of Mode II inspired the organisation of a series of recent research programmes, as National Science Foundations increasingly invite societal partners to take part in the designing, the assessment and the valorisation thereof. Particularly some German-speaking

European countries initiated research programmes along the ideas of Mode II, then often labelled as ‘transdisciplinary’ (cf. Thompson Klein et al. 2001).

Social learning for sustainability

The active role of society in knowledge production is also emphasized by the ‘social learning’ approach, yet from an explicitly normative point of view. This approach is connected to the emerging field of ‘sustainability science’ (Kates, Clark et al. 2001). The central claim of the approach is that joint knowledge production and mutual learning of science and society is necessary to foster the transition to a sustainable society: “Combining different ways of knowing and learning will permit different social actors to work in concert, even with much uncertainty and limited information” (Kates, Clark et al. 2001).

The chief motivation to include other forms of knowledge than the classical ones is threefold. First one refers to the multi-scale structure of global social-environmental systems, and second, to the multiple, interactive and often cumulative character of environmental stresses. These two characteristics, labelled ‘complexity’, ‘multidisciplinary’, etc., by other scholars, ask for a broad knowledge basis to assess the ecological crisis and to develop mitigation strategies. This argumentation for quality is quite similar to what we heard from the approaches of post-normal science and Mode II. The third argument used here builds a bridge to the governance approaches we discussed in this paper earlier: stakeholder involvement is required to foster commitment to the process of sustainable development (Siebenhüner 2003). By stressing the importance of mutual learning and empowerment of the stakeholders to become a part of the solution of the ecological crisis, this approach is more political than those referred to above. It tends to trigger societal change by finding new ways of knowledge production and decision making and raising ecological awareness simultaneously.

3.3 In summary...

In summary we can conclude that, despite the variety of approaches on new knowledge, the production and the use thereof, all of them question the exclusive claim on providing ‘true’ knowledge by classical sciences. In doing so, these approaches refer, explicitly or more implicitly, to either epistemological issues or to the complexity of contemporary societal issues that goes beyond the capacity of classical knowledge as a main cause of ‘uncertainty’. This uncertainty calls for a new form of knowledge, including a renewed organisation of knowledge production and of the quality assessment thereof.

When qualifying these approaches we conclude that, in terms of Table 1, (1) they mainly address conceptual issues, falling short in operational suggestions and (2) they are rather ambivalent in terms of being descriptive or prescriptive. All approaches indeed suggest that we already witness the evolution

or transition they advocate simultaneously. In terms of Table 2 we conclude these approaches to be biased by a positive attitude towards participatory approaches, assuming more or less automatically that participatory approaches indeed will further both the quality and the impact of the knowledge produced.

The research projects we referred to in the introduction envisage an evaluation of (a) the gradual evolution of participatory approaches in knowledge-extensive processes of decision-making, and (b) their actual contribution to the quality of knowledge production and the impact thereof on decision-making. As both projects started only recently, they hitherto mainly engaged in theoretical literature on the one hand, and in the reviewing of participatory approaches that already have been analysed by others. We briefly report on these latter efforts in the next section.

3.4 Participatory environmental knowledge production: some cases

There is a growing literature that reports on a series of experiments, projects and programmes of participatory knowledge production. This literature, first, reports on a huge variety of methods and processes: consensus conferences, citizens juries, future search conferences, scenario-development, back-casting procedures, fore-sight procedures, participatory (local) planning methods, participatory product development, participatory modelling, etc. Second, this great variety of methods and processes has been applied on different scales (from the local to the national), with scopes, on varying issues, with different aims and within varying policy contexts. Third, even though addressing rather similar ambitions and processes, literature differs in the concepts and the criteria for assessments used, depending partly on theoretical assets, partly on the area of application concerned. As to the former, empirical literature generally refers to the theoretical literature reported on in section 3.2. As to the latter, one often distinguishes in Participatory Integrated Assessment, Participatory (Constructive) Technology Assessment and Participatory Planning Methods. Below we will range a series of cases along a policy chain: from problem structuring and scenario-building, via decision-making into monitoring and reporting.

The small sample of projects that we report on below is, by no means, representative for the multitude of cases described. Yet we hope to draw some general conclusions on them, in an attempt to build a framework for interpretation and assessment.

ULYSSES

One of the first citizen participation projects in Integrated Assessment was the ULYSSES project (Urban Lifestyles, Sustainability and Integrated Environmental Assessment) (Kasemir et al. 2003). The main ambition of ULYSSES was to develop a new methodology of communication between practitio-

ners and users of environmental science, the latter including citizens especially. The central idea behind ULYSSES is that the public and policy makers can provide information that is useful for the development and the application of environmental modelling as a method to support decision-making. The project focused on (different ways of) framing or structuring the problem of climate change and, as a consequence, to model it. Within the project one established specially designed focus groups to ascertain citizens' views on the issue of climate change to interact with IA computer models. These focus groups were conducted in seven metropolitan European areas - with approximately 600 participants in total -. In addition, special sessions were conducted with regional decision makers and with representatives of the financial world and the media.

The project resulted into a detailed inventory of the way citizens perceive climate change and frame it. One of the outcomes was that "ordinary people from across Europe usually framed climate impacts in ethical rather than in economic terms" (Kasemir et al. 2000). Participants usually preferred strong reductions of energy use in the next decades, despite the scientific uncertainties about climate change.

The project has been a milestone for the development of a methodology of citizens' participation in Integrated Assessment, particularly with regard to its openness to citizens' contribution throughout. Moderators of the focus groups avoided using (implicitly framing) phrases such as "global warming" and "The Environment". The moderators were instructed not to limit the discussion to the rationale of the used models and to avoid an expert role. The involved scientists learned about the different aspects of the usefulness of their models in the policy context and overall methodological questions. Ravetz concludes that "such an outcome is the essence of post-normal science, that in these conditions the experts also have something important to learn"(Ravetz 2003). Despite this positive assessment, other authors are more critical, as the original idea of creating a (systematic) feedback into Integrated Assessment modelling has proved difficult to fulfil within the framework of the project (Siebenhüner 2004). This might be a missed opportunity, considering that there have not been so many big participatory projects that aimed at bringing the ideas of post-normal science into practice.

COOL

Another well known and extensively described project on participatory Integrated Assessment was the Dutch COOL-project (Climate Options On the Long term) (Van de Kerkhof 2004). In contrast to ULYSSES, the COOL-project did not involve 'ordinary citizens', but professionals representing a series of stakeholders.

The overall aim of the COOL-project was to develop possible scenarios for long term climate policies at national, European and global level. The national part of the project aimed at developing somewhat more concrete CO₂-reduction strategies within certain economic sectors in a long term perspective.

Starting point was a reduction of CO₂-emissions of 80 % by the year 2050. Different sector groups used a back casting methodology to identify pathways and a 'repetetory grid analysis' to rank different options.

The COOL project clearly reflects a problem of many participatory projects - whether in knowledge production or not -, namely the difficult 'trade-off' between democratic aims and ambitions on the one hand, and aims and ambitions in terms of the quality of the knowledge acquired by the process. Setting in advance the (hypothetical) goal of 80 % emission reduction allowed a creative, efficient and well focused process between the stakeholders involved, but excluded the stakeholders from framing the problem and the goal setting differently - as they were invited to do in ULYSSES -.

In addition, both ULYSSES and COOL have a weak linkage to political decision making, in other words, represent largely noncommittal processes that did not affect actual policy-making. But this seems to be a general conclusion, as Klopogge and Van der Sluijs state: "To our knowledge there have so far not been any Integrated Assessment Project with stakeholder involvement that were directly linked to the policy process of climate change" (Klopogge and Van der Sluijs 2005). Although both ULYSSES and COOL aimed at formulating political recommendations, decision makers did not take part in either process.

Eten en Genen

Although it suggested an impact on decision-making, the absence of politics was also one of the main critics formulated on the public debate 'Eten en Genen' in the Netherlands (2001). This public debate on genetic modification with regard to food quality and food safety was organised by the Dutch Ministry of agriculture (see Hage 2000 and www.etenengen.nl). The aim of the project was to find out under which conditions genetically modified food would be accepted by society, in other words to explore societal support for different policies and decisions on genetically modified food. A series of activities has been organised, such as focus groups, newspaper campaigns, opinion polls and (online) debates. The result of the overall process was a report on citizens' views, perceptions and priorities that was presented to the government.

There has been a lot of criticism on 'Eten en Genen', which can be summarized in two main points: the process management was debatable, and the political impact was very limited (see Hage 2002). As to the first point, the overall question of the debate ("under which conditions...") was heavily criticised as it was considered not open enough. More or less similar to COOL, the process was set up in such a way that participants had no say on the goal. In addition, and due again to the way the process was managed, ethic considerations and non-scientific views had little say. A public debate, suggesting it was looking for societal support, turned out into a mere consultation in which some deviant points of

view were more or less ignored. On top of that, critics said that citizens were badly informed about the legal and political context, in other words, about the degrees of freedom Dutch public authorities had after all on this issue.

As to the political impact of the process, that suffered from an unclear and insufficient linkage to political decision-making. When designing the process, Dutch government obviously had not reflected adequately on how to make the participatory process part of the political decision making - even if the envisaged impact was nil -. Now government seems to have agreed upon a sort of public participation, without however having made clear to what extent citizens actually could have a say.

Finally, and though a debate on genetically modified food inevitably should include scientific insights, debate and controversies thereon, 'Eten en genen' was not fairly connected to scientific research either. The biased presentation of scientific controversies was one of the reasons why the NGOs left the process. 'Eten en Genen' unfortunately illustrates as to how a participatory procedure that has not been well designed tends to even increase mistrust in stead of building trust. One could say the procedure got lost in 'the interface between science and policy'.

Local environmental monitoring

Whereas most projects on participatory environmental knowledge production do apply to the stages of problem definition and framing, to scenario-building and policy design, a few do relate to other stages of the policy chain. As the Research-project carried out by Hage will relate to the opportunities for participatory designs in environmental reporting, we do have particular interests in projects related hereto.

Yearley et al. (2003) report on a participatory modelling exercise that relates to monitoring at local, i.e. at city level. The aim was to produce spatial representations of local perception and knowledge on air pollution. As to the processing, the project, carried out in three English cities, made use of the 'community planning exercises' method that works on group discussions by mapping. The results of this three-city case study in the UK were encouraging on the usability and feasibility of this kind of participatory knowledge production. First, the high degree of overlap of the local air quality perception with the scientific models allows confidence in the citizen maps as an accurate representation of air quality. As a consequence of this overlap, the processes resulted into mutual trust of the (scientific and lay knowledge) information provided. Second, the citizens maps were useful to locate sites for additional monitoring, precisely in those areas where the citizen expertise diverged from the scientifically modelled maps. The authors are convinced that "this form of consultation has practical appeal to officials and local authorities" (Yearley et al. 2003). This case can indeed be named as one of the rare success stories of participatory knowledge production, since the participatory modelling exercise pro-

duced *new* knowledge that appeared not only to be *relevant* to the policy process but was actually *used* therein.

National environmental reporting

For some time now either OECD- and EU-member states have to make a 'state of the environment report' (SoER), mostly on an annual or biennial basis. Over the years the format of these environmental reports has been largely harmonised along the DPSIR-model, facilitating the European Environmental Agency and other interested parties to be able to quickly compare environmental pressures, qualities and responses in different states. In most states, this SoER is produced within a process that mainly, if not solely includes public authorities, public research institutes, some other data providers and experts. This is, among other nations, the case in the Netherlands and France, where the production of the SoER is the formal responsibility of the Netherlands Environmental Assessment Agency (MNP/RIVM) Milieu and the Institut Français de l'Environnement (IFEN) respectively.

The Flemish SoER presents an interesting example of a process that can be labelled as a new form of knowledge production, for mainly two reasons. First, although the making of the Flemish SoER is the responsibility of the Flemish Environmental Agency, that created a special unit for this task, the process is supervised and guided by a steering committee. Apart from representatives from governmental bodies, this steering committee also comprises representatives from employers' and employees' organisations, from environmental action groups - whose membership is formally established -, and some 'independent' experts - to be appointed on the committee's chairman's proposal -. Within the framework and format that is agreed upon internationally, the steering committee can emphasise certain environmental issues, giving less priority to others, introduce new issues, call upon contradicting expertise etc. The result is a report that not only reflects scientific priorities, but also reflects the agenda formulated by the societal groups represented. Second, although the task force has the final editing responsibility for the report, it invites authors to contribute to the different chapters and others to comment draft versions thereof. Both these authors and 'lectors' (reviewers) originate from a variety of backgrounds: academia, interest groups, research institutes, private consultancy, industries, environmental organisations etc. This procedure has been designed and used right from the start of Flemish SoER in the mid 1990s. It resulted into a real mobilisation of expertise, as over 100 authors and over a few hundred lectors were involved in the process of the latest SoER (2004). Apart from the fact that this process, by its very mobilisation and its system of 'extended review', contributes to an increasing quality of the SoER, the product itself, i.c. the SoER is increasingly considered as 'the' authority with regard to environmental data and their interpretation. In other words, in this case the joint production of environmental knowledge seems to have led into a report of high quality, with a common assessment thereof, and into a report that is widely accepted and societally supported.

4. Conclusions

This paper so far reported on literature on participatory governance in general (section 2) as a background for an exploration of the literature on participatory knowledge production (section 3). As said both are examined here in order to identify the components that may be used within an evaluative framework for participatory approaches in knowledge-intensive environmental policy-making. As such, it may be helpful to indicate some emphases in future research.

Although we do not want to extend the parallels too far, there are some striking similarities in both debates.

- Both debates reflect a first wave of enthusiasm supported by largely similar arguments. Participatory approaches should be the remedy for decreasing legitimacy and societal support for both politics and scientific knowledge. At the same time one has to acknowledge that a large part of this enthusiasm is build upon prescriptive perspectives, rather than on thorough empirical investigation. In terms of Table 1: the right hand boxes are relatively overpopulated.
- Empirical investigations are present as well, as section 3.3. has shown, but in our view they are too restricted in their emphasis on issues of process management. For example, COOL and ULYSSES are well elaborated methods and have been remarkable in their sort, but a critical evaluation should supersede questions of participatory design. In terms of Table 2: the upper boxes are relatively overpopulated. This has led to a series of design criteria that address stakeholders selection, the timing ,methods, and the status of the process outcome.
- Gradually though, one establishes an increasing critique on participatory approaches that address the a) the actual *quality* of their outcomes and b) the *impact* these participatory processes have within a political and institutional context. Regarding the former, critics doubt the surplus of participatory approaches for the quality of knowledge for decision making (Korf 2003; Mostert 2003; Irvin and Stansbury 2004; Rayner 2003). And they question its quality as these participatory approaches tend to realise a *trade-off* between two goals that are often contradictory: an open access to all kind of participants on the hand and assuring a better quality of knowledge production. It is this trade-off issue that lead Collins and Evans (2002) to argue that the problem of legitimacy has been replaced by the problem of extension. As if participation - primarily meant to increase trust and legitimacy - in itself would guarantee a better quality simultaneously. They therefore suggest a new definition of expertise. Even though expertise should be wider than just scientific expertise, stakeholders can not have the same weight in knowledge production processes as professional experts automatically. In brief, Collins and Evans envisage to stop the absolute openness of participatory

processes, their accessibility to everyone, and to replace those by a selective, still 'expert-driven' accessibility.

With regard to the latter, there is increasing questioning on the actual added value of these processes and of the cost-effectiveness of the huge efforts they often represent. According to the lower boxes of Table 2, the questions that arise refer to the relevance of particular institutional and political aspects. This counts for both processes of knowledge production and decision-making, as the established scientific-institutional context may hinder the formulation and implementation of new participatory approaches in knowledge production.

References

- Arts, B. (2005, forthcoming), Non-state actors in global environmental governance – new arrangements beyond the state, accepted for publication in a *Palgrave* volume on ‘Global Governance’, edited by Michael Zürn and Mathias Koenig-Archibugi.
- B. Wynne (1996), May the sheep safely graze?, in S. Lash, B. Szczyński and B. Wynne (eds.), *Risk, Environment and Modernity*, London: Sage: 44-83.
- Blowers, A. and P. Leroy (1996), Environment and Society - Shaping the Future, in A. Blowers and P. Glasbergen (eds.), *Environmental Policy in an International Context*, Volume 3: Prospects for Environmental Change, London: Arnold: 255-283.
- Boudourides, M.A. (2003), Participation under uncertainty, paper presented at the Conference ‘VALDOR 2003: Values in Decisions on Risk, Stockholm, Sweden, June 9-13.
- Bulkeley, H. and A.P.J. Mol (2003), Participation and Environmental Governance, *Environmental Values*, Vol. 12: 143-54.
- Collins, H. M. and R. Evans (2002), The Third Wave of Science Studies: Studies of Expertise and Experience. *Social Studies of Science*, vol. 32 : 235-296.
- Held, D. (1999), Catastrophe in the making: globalization and the environment, in: D. Held and A. McGrew (eds.), *Global Transformations: politics, economics and culture*, Stanford, CA: Stanford University Press: 376-413.
- Douglas, M. T., and A.B. Wildavsky (1983), *Risk and Culture: an Essay on the Selection of Technical and Environmental Dangers*. Berkeley and Los Angeles: University of California Press.
- Flyvbjerg, B. (1998), *Rationality and Power. Democracy in Practice*, Chicago and London: The University of Chicago Press.
- Ford, L.H. (2003), Challenging Global Environmental Governance: Social Movement Agency and Global Civil Society, *Global Environmental Politics*, Vol. 3 (2): 120-134.
- Funtowicz, S. and J. Ravetz (1993), Science for the post-normal age, *Futures*, 25: 739-755.
- Gibbons, M. et al. (1994), *The new production of knowledge*, London: Sage Publications.
- Gieryn, T. (1983), Boundary work and the demarcation of science from non-science, *American Sociological Review*, 48: 781-795.
- Goodin, R.E. and S.J. Niemeyer (2003), When Does Deliberation Begin? Internal Reflection versus Public Discussion in Deliberative Democracy, *Political Studies*, vol. 51, pp. 627-649.
- Grote, J.R. and B. Gbikpi (eds.), *Participatory Governance. Political and Societal Implications*, Opladen: Leske + Budrich.
- Hage, M. (2002), *De maatschappelijke omgang met nieuwe risico's: het publieke debat 'Eten en Genen' als voorbeeld*, Master Thesis University of Nijmegen, unpublished (in Dutch).
- Hajer, M. (1995), *The Politics of Environmental Discourse: Ecological Modernization and the Policy Process*, Oxford: Oxford University Press.
- Hajer, M.A. and H. Wagenaar (eds.) (2003), *Deliberate Policy Analysis – Understanding Governance in the Network Society*, Cambridge: Cambridge University Press.
- Healey, P. (1997), *Collaborative Planning: Shaping Places in Fragmented Societies*, Basingstokes, Hants: MacMillan.

- Healey, P. (1998), Collaborative planning in a stakeholder society, *Town Planning Review*, 69 (1): 1-21.
- Healy, S. (2001), Risk as a social process: the end of 'the age of appealing to the facts?', *Journal of Hazardous Materials*, vol. 86: 39-53.
- Held, D. (1999), Catastrophe in the making: globalization and the environment, in: D. Held and A. McGrew (eds.), *Global Transformations: politics, economics and culture*, Stanford, CA: Stanford University Press: 376-413.
- Hisschemöller, M. and R. Hoppe (1996), Coping with intractable controversies: the case for problem structuring in policy design and analysis, in: *Knowledge and Policy*, vol. 8 (4): 40-60.
- Holländer, K. and P. Leroy (2001), From Scepticism to Good Practices and Tough Challenges, in J. Thompson Klein, W. Grossenbacher-Mansuy, R. Häberli, A. Bill, R.W. Scholz and M. Welte (eds.), *Transdisciplinarity: Joint Problem Solving among Science, Technology and Society*, Berlin/Basel: Birkhauser Publisher: 217-235.
- Irvin, R.A. and J. Stansbury (2004), Citizen Participation in Decision Making: Is It Worth the Effort?, in: *Public Administration Review*, Vol. 64, no. 1: 55-65.
- Irwin, A. (1995), *Citizen Science: a study of people, expertise and sustainable development*, London: Routledge.
- Jasanoff, S. (1990). *The Fifth Branch: Science Advisers as Policy Makers*. Cambridge, Mass., Harvard University Press.
- Jessop, B. (1998), The rise of governance and the risks of failure: the case of economic development, in: *International Social Science Journal*, Vol. 50 (155): 29-45.
- Jessop, B. (2000), Governance Failure, in: G. Stoker (ed.), *The New Politics of British Local Governance*, Basingstoke: Macmillan, pp. 11-32.
- Joly, P.-B. and G. Assouline (2001), *ADAPTA project: Assessing Public Debate and Participation in Technology Assessment in Europe*, Final Report, Grenoble: INRA, <http://www.inra.fr/Internet/Directions/SED/science-gouvernance/pub/ADAPTA/index.html>, last accessed on June 9, 2005
- Joss, J. and S. Bellucci (eds.) (2002), *Participatory Technology Assessment. European Perspectives*, CSD, London.
- Kasemir, B., D. Schibli, et al. (2000), Involving the Public in Climate and Energy Decisions - need for public support, *Environment*, vol. 42: 32-42.
- Kasemir, B., J. Jäger, C.C. Jaeger, and M.T. Gardner (eds.) (2003), *Public Participation in Sustainability Science. A Handbook*, Cambridge: Cambridge University Press.
- Kates, R. W., W. C. Clark, et al. (2001), Sustainability Science, *Science*, vol. 292: 641-642.
- Keller, R. and A. Pöferl (2000), 'Habermas Fightin' Waste. Problems of Alternative Dispute Resolution in the Risk Society', *Journal of Environmental Policy and Planning*, vol. 2: 55-67.
- Keohane, R.O. (2002) [2000], Governance in a partially globalized world, in Keohane, R.O., *Power and governance in a partially globalized world*, London: Routledge: 245-70.
- Kerkhof, M. van de and P. Leroy (2000), Recent Environmental Research in the Netherlands: Towards Post-Normal Science?, *Futures*, 32: 899-911.
- Kerkhof, M. van de (2004), *Debating Climate Change. A Study of Stakeholder Participation in an Integrated Assessment of Long-Term Climate Policy in the Netherlands*. Amsterdam, Lemma.
- Kersbergen, K. van and F. van Waarden (2004), Governance as a bridge between disciplines: Cross-disciplinary inspiration regarding shifts in governance and problems of governability, accountability and legitimacy, *European Journal of Political Research*, Vol. 43: 143-171.

- Klopprogge, P. and J. P. Van der Sluijs (2005), The inclusion of stakeholder knowledge and perspectives in Integrated Assessment of climate change, Revised manuscript prepared for *Climatic Change*, submitted Feb 2005.
- Klüver, L., M. Nentwich, W. Peissl, H. Torgersen, F. Gloede, L. Hennen, J. van Eijndhoven, R. van Est, S. Joss, S. Bellucci, D. Bütschi (2000), *EUROPTA: European Participatory Technology Assessment. Participatory Methods in Technology Assessment and Technology Decision-Making*, Copenhagen: The Danish Board of Technology.
- Kooiman, J. (2000), Societal Governance: Levels, Modes, and Orders of Social-Political Interaction, in: Pierre, J. (ed.), *Debating Governance. Authority, Steering, and Democracy*, Oxford: Oxford University Press: 138-164.
- Kooiman, J. (2002), Governance: A Social-Political Perspective', in: Grote, J.R. and B. Gbikpi (eds.), *Participatory Governance. Political and Societal Implications*, Opladen: Leske + Budrich: 71-96.
- Korf, B. (2003), Partizipation als Tyrannei? Möglichkeiten und Grenzen kooperativer Planungsmethoden in der ländlichen Entwicklung. Berlin.
- Lebessis, N. and J. Paterson (2000), *Developping New Modes of Governance*, European Commission Forward Studies Unit, Working Paper, see http://europa.eu.int/comm/cdp/working-paper/nouveaux_modes_gouvernance_en.pdf, last accessed on June 9, 2005.
- Leroy, P. (2002), Environmental politics, participation and political inequality, in L. Draetta L et F. Lai (dir.), *Naturalia. Sciences Sociales et Environnement: entre cadres théoriques et approches empiriques, numéro thématique d'EUROPAEA*, Vol. VIII, 1-2: 153-167.
- Magnette, P. (2003), European Governance and Civic Participation: Beyond Elitist Citizenship?, *Political Studies*, vol. 51: 144-160.
- Mostert, E. (2003), The Challenge for Public Participation, *Water Policy*, Vol. 5: 179-197.
- Nowotny, H., P. Scott, et al. (2005, forthcoming), *Re-Thinking Science: Mode 2 in Societal Context. Knowledge Creation, Diffusion and Use in Innovation Networks & Clusters: A Comparative Systems Approach Across the U.S., Europe and Asia*, Greenwood: Publishing Group Praeger Books.
- Pearson, P. (1998), Political, Epistemological, Ecological and Spiritual Dimensions of Participation, in: *Studies in Cultures, Organizations and Societies*, vol. 4: 147-167.
- Pellizoni, L. (2001), Democracy and the governance of uncertainty: the case of agricultural gene technologies, *Journal of Hazardous Materials*, Vol. 86: 205-222.
- Pellizoni, L. (2003a), Uncertainty and Participatory Democracy, *Environmental Values*, 12: 195-224.
- Pellizoni, L. (2003b), Knowledge, Uncertainty and the Transformation of the Public Sphere, *European Journal of Social Theory*, Vol. 6 (3): 327-355.
- Pierre, J. (ed.) (2000), *Debating Governance: Authority, Steering and Democracy*, Oxford: Oxford University Press.
- Pløger, J. (2001), Public participation and the art of governance, in: *Environment and Planning B: Planning and Design*, vol. 28: 219-241.
- Ravetz, J. (1999), What is Post-Normal Science?, *Futures* 31: 647-653.
- Rayner, S. (2003), Democracy in the age of assessment: reflections on the roles of expertise and democracy in public-sector decision making, *Science and Public Policy*, vol. 30: 136-169.
- Rhodes, R.A.W. (1997), *Understanding Governance: Policy Networks, Governance, Reflexivity and Accountability*, Milton Keynes: Open University Press.

Richards, C., K. Sherlock and C. Carter (2004), *Practical Approaches to Participation*, SERP Policy Brief No. 1, Series Editors: C. Carter and C.L. Spash, Aberdeen, UK: Macaulay Institute.

Roqueplo, P. (1997), *Entre savoir et décision, l'expertise scientifique*, Paris: INRA Editions.

Scharp, L. and T. Richardson (2001), Reflections on Foucauldian Discourse Analysis in Planning and Environmental Policy Research, *Journal of Environmental Policy and Planning*, vol. 3: 193-209.

Schmitter, P.C. (2002), Participation in Governance Arrangements: Is there any reason to expect it will achieve "Sustainable and Innovative Policies in a Multi-Level Context"?, in: Grote, J.R. and B. Gbikpi (eds.), *Participatory Governance. Political and Societal Implications*, Opladen: Leske + Budrich: 51-70.

Siebenhüner, B. (2004), Social Learning and Sustainability Science: Which role can stakeholder participation play?, *Proceedings of the 2002 Berlin Conference on the Human Dimension of Human Change "Knowledge for the Sustainability Transition. The Challenge for Social Science"*: 76-86.

Smith, G. and C. Wales (2000), Citizens' Juries and Deliberative Democracy, *Political Studies*, vol. 48: 51-65.

Spash, C.L. (ed.) (2001), Participation, representation, and deliberation in environmental policy, *Environment and Planning, Part C, Government & Policy*, Vol. 19 (4), Special Issue.

Stoker, G. (1998), Governance as theory: five propositions, *International Social Science Journal*, Vol. 50 (155): 17-28.

Tatenhove, J. van, and P. Leroy (2003), Environment and Participation in a Context of Political Modernisation, *Environmental Values*, Vol. 12: 155-74.

Tatenhove, J. van, B. Arts and P. Leroy (2000), (eds.), *Political Modernisation and the Environment - The Renewal of Environmental Policy Arrangements*, Dordrecht: Kluwer Academic Publishers.

Taylor, I.E. (2001), The Genetically Modified Maize Debacle: A Case Study of Policymakers' failure to Deal with Scientific Uncertainty even after BSE, in: M. Hisschemöller, R. Hoppe, W.M. Dunn, J.R. Ravetz (eds.), *Knowledge, Power and Participation in Environmental Policy Analysis*, New Brunswick/ London: Transaction Publishers.

Theys, J. (2002), Environmental Governance: From Innovation to Powerlessness, in: J. R. Grote and B. Gbikpi (eds.), *Participatory Governance. Political and Societal Implications*, Opladen: Leske + Budrich: 213-244.

Thompson Klein, J. W. Grossenbacher-Mansuy, R. Häberli, A. Bill, R.W. Scholz and M. Welti (2001) (eds.), *Transdisciplinarity: Joint Problem Solving among Science, Technology and Society*, Berlin/Basel: Birkhauser Publisher.

Torgerson, D. (2003), Democracy through policy discourse, in: M.A. Hajer and H. Wagenaar (eds.), *Deliberate Policy Analysis – Understanding Governance in the Network Society*, Cambridge: Cambridge University Press: 113-138.

Turnhout, E. and P. Leroy (2004). *Participating in uncertainty: A literature review of applying participation in the delivery of scientific policy advice*. RIVM report 550002008, Bilthoven: RIVM (in Dutch).

Wildavsky, A. (1979), *The Art and Craft of Policy Analysis*, Macmillan, London.

Yearley, S., S. Cinderby, J. Forrester, P. Bailey and P. Rosen (2003), Participatory modelling and the Local Governance of the Politics of UK Air Pollution, *Environmental Values*, 2003, 12: 247-262.