

How to select instruments for the resolution of environmental conflicts?

Heidi Wittmer*, Felix Rauschmayer, Bernd Klauer

UFZ Centre for Environmental Research Leipzig-Halle, Department of Economics, Sociology and Law, Permoserstr. 15, 04318 Leipzig, Germany

Abstract

This editorial shows that environmental conflicts are characterised by the combination of two types of complexities, ecological and societal. Decisions to resolve these conflicts have often been oriented to efficiency improvements and/or cost-effectiveness, and instruments to reach the decisions have been arranged accordingly. Both criteria do not suffice to distinguish appropriate instruments from those that cannot cope with the complexities. Therefore, new criteria oriented to process legitimacy and information management will be included in order to facilitate the selection of appropriate instruments for the resolution of environmental conflicts.

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Introduction

Efforts to protect the environment are frequently characterised by social conflicts. Traditional mechanisms for conflict resolution in European societies, such as using the juridical system, are increasingly considered to be insufficient to meet this challenge. Against this background, a summer symposium, funded by the European Science Foundation, was held in June 2002 in Leipzig to discuss “new strategies for solving environmental conflicts: potentials for combining participation and multicriteria analysis”. This special issue presents the contributions of the summer symposium. To provide a framework for the assessment of the different instruments of conflict resolution presented at the symposium, this editorial develops a set of criteria for the selection of instruments to resolve environmental conflicts. In the concluding section, we will use these criteria for a comparative assessment of the tools presented. This editorial proceeds as follows: in the next section, environmental conflicts are characterised as combining high degrees of societal and ecological

complexity. The third section reflects on the problem of selecting instruments for conflict resolution. In the fourth section, criteria for selecting instruments are discussed and the fifth section gives an overview of the contributions to this special issue.

The characteristics of environmental conflicts

Strategies for solving environmental conflicts need to address the problem that public environmental conflicts are characterised by the interaction of (1) ecological and (2) societal complexity.

1. One central feature of environmental conflicts is the complexity of the ecological system which is the natural base of the conflicts. Even if its understanding is accompanied by a high degree of scientific sophistication, there remains substantial uncertainty and ignorance. Questions of impact and causation, and of spatial and time scales often give rise to different plausible hypotheses without clear indications on their respective probabilities. Therefore, the process leading to the resolution of environmental

*Corresponding author.

conflicts must take into account scientific and idiosyncratic knowledge and must cope with unavoidable uncertainty and ignorance.

2. Another central feature of environmental conflicts is their societal complexity (Funtowicz and Ravetz, 1994; Funtowicz et al., 1997). Environmental land use conflicts are not only public conflicts in the sense that many are concerned by a decision. They are distinguished by two additional features: many of the concerned are not persons who may influence the decisions—they are foreigners with very little or no impact on the decision making body, not humans and/or not yet born (see on these Dobson, 1996; on other limits to political representation Meadowcroft, 2002). Some of the concerned are also actors who may impede the implementation of a decision, or, put positively, their accord is necessary for a successful implementation of the decision.

Besides this functional reasoning for participation resulting from the societal complexity, there are ethical-normative arguments focussing on popular sovereignty, equity and political equality (compare Webler and Renn, 1995). Whereas intra-generational equity is one aspect of environmental conflicts (cp. Martinez-Alier, 1995), there are more values at stake, i.e., mainly intergenerational fairness and intrinsic values of nature. There are doubts whether the traditional conflict resolution procedures can handle these new demands competently. A high degree of transparency seems to be the most promising measure to achieve effective and legitimate conflict resolution procedures in the face of doubts on representativeness (O'Neill, 2001). One effective way to achieve transparency is by including stakeholders or the general public in the decision process (cp. Lafferty and Meadowcroft, 1996). Transparency is augmented further by a structured process which is comprehensible for non-participants, too. Participation is understood here as: “forums for exchange that are organised for the purpose of facilitating communication between government, citizens, stakeholders and interest groups, and businesses regarding a specific decision or problem” (Renn et al., 1995, p. 2).

Multi-criteria decision aid proposes structures to decision makers. These structures are open to participation and allow for including different types of knowledge. They propose an analytical approach to the problem (i.e., problem definition, elaboration of a coherent family of criteria, designation of possible actions, criterial evaluation of the actions, and aggregation of the evaluations). Uncertainty and ignorance are relevant within each of these steps and uncertainty can be explicitly included. A common feature of all decision aid methods is the assumption that the preferences are formed or refined during the decision process. The aim is not necessarily the choice of one option, but more

generally the elaboration of preferences, criteria, actions, and evaluations (Roy, 1996; Roy and Bouyssou, 1993). Such “soft” decision tools recognise ignorance as an inherent property of the decision process. However, multi-criteria decision aid does often not take into account the role of stakeholder participation in society. Its rather technical approach focuses more on the aggregation problem of the criterial evaluations than on the legitimacy of the interests taken into account.

Therefore, the combination of participation and multi-criteria decision aid promises potential to improve the resolution of environmental conflicts: processes supported by both strategies offer possibilities to deal with ignorance and uncertainty, and can be structured in a way to include stakeholders and be comprehensible for outsiders.

- Ecological complexity recommends the use of decision tools able to take into account scientific and idiosyncratic knowledge, uncertainty, and ignorance. Certain forms of multi-criteria decision aid fulfil this demand for the structured consideration of information of different types and quality.
- Societal complexity calls for stakeholder participation. Decision structuring tools offer the possibility to make participatory decision processes more transparent. Multi-criteria decision aid places emphasis on the structuring of the decision. This facilitates exchange within the decision group as well as with the respective constituencies and the general public.

In this issue, we suggest criteria to concentrate on both aspects, societal and ecological complexity, and we examine strengths and weaknesses of different participatory and multi-criteria approaches. Both general strategies, i.e. participation, focussing on an intensive integration of stakeholders, and multi-criteria decision aid as a special case of multi-criteria analysis, focussing on uncertain data and values, play a prominent role in the resolution of environmental conflicts (cp. Nothdurft, 1995; Paruccini, 1994; for a combination: De Marchi et al., 2000), but there have been few attempts to find a common methodological framework (one example is Banville et al., 1998).

This issue is a first step in this direction. Rather than determining whether the resolution made with a special approach in a special case is a “good” resolution, we clarify what could be a “good” approach to resolve a conflict. As we acknowledge the fundamental plurality of value systems irreducible to only one system (see on this: van den Hove, in this issue), it is not possible to deduce from such a hypothetical common value system what constitutes a good instrument. Therefore, we are confronted with the problem of how to select adequate instruments for the resolution of environmental conflicts without being able to deduce them logically.

We recognise that a good solution in a conflict may also be to sharpen the conflict or to let things evolve without interfering in the social process. The focus in this article and in this issue however is not to decide what to do with environmental conflicts, but rather to decide which approach to use once it has been decided to try resolving the conflict.

Reflections on the problem of how to select instruments

A variety of different instruments are available and, as the papers show, many can be combined. Without providing a fully-fledged normative foundation this special issue wants to make a more pragmatic contribution to this meta-decision problem.¹ The objectives are to explore and better understand some of the experiences made with the combination of methods from citizen participation and multi-criteria decision aid. This special issue wants to sharpen the understanding of potentials and limitations of different instruments but also highlight some options from the wide array of possible combinations. We chose an approach that combines evaluations of approaches by—if not universal—but nevertheless central criteria with the requirements of the environmental conflict at hand. Our discussion here will lead to a first clarification of the criteria rather than to concrete measures of the performance of the instruments. In the conclusions to this issue we will apply these criteria to the approaches presented in the following contributions.

The problem for the scientific adviser to environmental conflicts consists in selecting an appropriate instrument out of a large variety of different approaches. It is the aim of this paper to discuss the course of selecting an instrument for the resolution of environmental conflicts and particularly to elucidate criteria that can guide this selection.

Our pledge is for a more integrative perspective when developing and/or selecting instruments for the resolution of environmental conflicts. Particularly, we see that an integrative combination of analytical and participatory approaches allows decision makers to consider different values and interests. Such an appropriate consideration is essential for good decision-making—the structured confrontation of different interests and their deliberative resolution enables the participants to confront their sometimes non-reflected values and ways of behaviour with different values than their own. This confrontation allows for the reflection of conventional values, and herewith for the emergence of new, context-dependent values and ways of behaviour in order to improve human life. This emergence furthers individual

and institutional change. For each of the participants, improvements of human life can be achieved on different, multiple dimensions. Just as one cannot judge the goodness of decisions on monistic grounds, i.e., on the basis of only one value or basic principle, it is impossible, too, to decide on the goodness of decision-making instruments on monistic grounds. In both cases, it is essential, though, to elaborate criteria which differ in their relative importance and appropriateness according to the specific context at hand.

These criteria should not exclude certain types of values, but be able to cover all values that are relevant for the resolution of the conflict (Rauschmayer, 2001). In the case of environmental conflicts, intrinsic values of nature or rights of future generations are typically of special importance.

Criteria for the appropriateness of instruments

Reasoning behind the list of criteria: coping with ecological and social complexities

There are many and different derivations of criteria which aim at evaluating or characterising approaches for environmental decision support or conflict resolution. The intentions of the different authors range from evaluation against a normative ideal, derived from discourse ethics (e.g. Webler, 1995), to evaluating approaches from the perspective of facilitators involved in actual decision support. Our intention is to provide criteria to facilitate the selection of an instrument to be applied in environmental conflict resolution. The list of criteria which has been developed in the context of the Summer Symposium takes up elements from several of these derivations. It deviates in some points because of its focus on ecological and social complexities in environmental conflicts, and, more specifically, it deviates from the path-breaking list of Webler and Renn (1995) because of its more pragmatic approach. Pragmatic is understood here in both senses, in the philosophical as well as in the way it is used in common language.

Many of the lists (e.g. Renn and Hampel, 1998) use the criterion of efficiency as one criterion amongst others. Especially in interaction with economists, this might create some confusion, as economists generally use this criterion to judge all effects comprehensively (sometimes leaving equity issues explicitly aside). Neo-classical economics is based on a consequentialistic view, defining the goodness of a decision only according to its consequences. Furthermore, it is asserted that all consequences may be measured on one scale. On this basis, it would be sufficient to consider the criterion of efficiency as the only criterion deciding about goodness. We do not agree with this assumption and—for reasons

¹Discourse ethics can provide a normative basis for participatory decision approaches, e.g. Webler (1995); O'Hara (1996).

of epistemological clarity—we do not use efficiency as a criterion (cp. e.g. Martinez-Alier et al., 1998; Rauschmayer, 2001). We rather use the costs of conflict resolution tools understood in a wide sense (see below). This criterion will be considered and combined with other criteria according to the specific requirements in the conflict under consideration.

Besides the cost criteria, we define and discuss three additional dimensions of a good decision process to better deal with societal and ecological complexities: information management, legitimacy, and social dynamics.

Further operationalisation is dependent on the context of a decision situation. Of course, an evaluation cannot be absolute and a criterion that is decisive in one conflict might be negligible in the next. According to our pragmatic proceeding, a rough description of evaluation criteria for decision tools is appropriate: it helps the people taking part in a decision-making process to choose the tool they consider adequate in the specific situation. We suggest using the criteria to evaluate the potential of an approach, put differently: how well it is suited to deal with a certain aspect.

Information management

As discussed above, environmental conflicts are characterised by ecological and societal complexities. Therefore, the ability of a decision aid in acquiring and structuring information constitutes an important characteristic. The existing knowledge is complex, often conditional, certain outcomes can be reached by various options, and probabilities may or may not be known; additionally, the available information is often incomplete. Two different types of information to improve the quality of environmental decisions can be distinguished: one is scientific or technical knowledge on the processes involved and on the probabilities of certain outcomes. This information comes from different scientific disciplines and needs to be integrated; trade-offs and interactions need to be assessed. The second type is location specific or idiosyncratic knowledge, based on the experience users have acquired with a specific resource in a specific location. Again this type of knowledge can be held by different groups of people, often stakeholders in the conflict, but others as well. Depending on the kind of conflict, the relative importance and availability of these two types of information vary. The second is typically important in situations of natural resource management, like water management or nature protection. Modelling is often used to integrate information from natural or social sciences, but it may prove insufficient for integrating knowledge from both groups of sciences, and, even more, in integrating scientific and idiosyncratic knowledge. Furthermore, in each of these areas, the type and

amount of risk, uncertainty, and ignorance is different—which makes integration even more difficult.² Taking these aspects into account, three different criteria for dealing with information can be derived:

- (1) how well can different types of information (different disciplines, idiosyncratic knowledge) be elucidated,
- (2) how are different types of information integrated within the approach,
- (3) how are uncertainty and ignorance taken into account?

Legitimacy

The discussion on legitimacy in Kauffmann, (1999 Philosophical Encyclopaedia) can be summarized as follows: if the legitimacy of a decision is doubted, then it is doubted that this decision is compatible with generally agreed principles. A decision may be legitimate, if it is functional for the good life of the concerned persons or, alternatively, if the concerned persons (or—procedural fairness guaranteed—a majority thereof) expressed freely their agreement with the decision. The debate on “ecological dictatorship” shows that there may be a high tension between these two differing models of legitimacy (Kauffmann, 1999). In each society, there are sets of rules and procedures for the resolution of conflicts and what is considered as fair in terms of process as well as in terms of outcome. Often, a decision is considered legitimate, if it is compatible with the prevailing set of rules in a society. This understanding of legitimacy combines the first two reasons given for legitimacy under the assumption that the prevailing set of rules is functional for the good life of the concerned persons, and that the concerned persons would accept any decision which is not incompatible with this set of rules. If a decision-making process is incompatible with the prevailing set of rules in a society it might fail for this reason.

In a first approximation we define a conflict resolution process as legitimate, if it is perceived as complying with the formal and informal procedures perceived as adequate in the respective context by all parties affected. In assessing legitimacy, one has to take into consideration that decision-making contexts differ widely.

- Decision support can be granted directly to the decision makers by involving them or as a means to inform them.
- Decision support and conflict resolution can be granted in different stages of a policy process drafting

²For an overview on decisions made in the face of uncertainty, the principle of caution and similar topics see i.e. Perrings (1991); Crawford-Brown (1999).

new policies, defining strategies or in the implementation phase of already existing policies.

- The acceptance of the process and its outcome by the local and broader community including the political and administrative actors involved is contingent on the legal and political as well as on the cultural frame conditions.

According to the legal frame conditions, certain aspects might be formally regulated or open to debate. Two especially important aspects in the context of participation are: first, who holds the rule-making authority including the decision on whether participation is granted voluntarily by an agency or an actor or whether it constitutes a right of certain groups or individuals. Second, the decision-making power or authority includes aspects like how binding the outcome is and who can be held accountable for it (Steelman and Ascher, 1997). To increase the legitimacy of the conflict resolution process and its outcome, it is useful, if an approach is flexible enough to be adapted to how decisions are actually made within a given society. Knowledge on how decisions are made is also helpful in order to increase the probability of providing inputs that can and will be used in the policy process. A closely related question is: who has a right to participate? This can range from the population of an area, those directly affected, to representatives of predefined interest groups, etc. (Johnson and Wilson, 2000). This dimension of a good decision process concerns questions such as: whether all relevant interests are represented adequately and whether the procedure permits to protect or ideally enhance the interests involved. Inclusion per se is by no means sufficient. The issue is whether all relevant interests and affected stakeholders are known, included and/or represented in a way to assure their equitable participation in the process. At the same time, the power relations between different stakeholders need to be taken into account. It is important to keep in mind that social dynamics do not disappear simply by inviting all relevant interest groups to participate. A decision-making procedure can enforce or counteract prevailing differences in power. This also includes questions like: are the least powerful represented—are they known about? Are the rules such that they can articulate their interests?

It is by no means trivial to identify all the interests involved in a specific conflict, especially when taking into account that many environmental decisions have far reaching consequences with regard to time and space. ‘Global warming’ or ‘loss of biodiversity’ are just the most evident examples. It is still more difficult to represent all interests, even the interests of those who cannot express them. There is no such thing as the “right” way to represent next generations or animals, but decision procedures allow for such a

Table 1
Criteria for evaluating decision aid methods

<i>Information</i>	Coping with complexity Integrating different types of information Coping with uncertainty
<i>Legitimacy</i>	Legal compatibility and integrating procedural knowledge Accountability Inclusion/representation Transparency of rules and assumptions to insiders and outsiders
<i>Social dynamics</i>	Respect/relationship Changing behaviour, changing perspectives/learning Agency/empowerment Facilitate convergence or illustrate diversity
<i>Costs</i>	Cost-effectiveness Costs of the method Decision failure costs

representation to differing extents (on future generations compare Weikard, 1999). In conflicts where such considerations are important to some of the participants, reflections on representation of interests that cannot be expressed by those who have the interests should be included in the selection of an appropriate method.

Obviously there are trade-offs between the quality of a decision-support process and the directness of participation. Where participation is direct as in referenda, at least the living, eligible to vote can be involved in the decision. However the amount of information that can be managed in a referendum is minimal (Steelman and Ascher, 1997). In the face of doubts on representativeness the transparency of decision rules can contribute to the perceived legitimacy of the decision-making process.

Based on the above, we suggest the following set of criteria:

- (1) *Legal compatibility*: Are the procedure and the proposed outcome compatible with existing legislation? This includes how well procedural knowledge is acquired and accounted for within the approach.
- (2) *Accountability*: Is someone held accountable for the decision and its outcome? Is it clear who?
- (3) *Interest representation*: Are all relevant interests included or at least represented?
- (4) *Transparency*: Are rules and assumptions transparent to insiders and outsiders?

These aspects taken together determine the risk of a decision being rejected as illegitimate. They obviously depend heavily on the political and legal context. Table 1 gives an overview of all criteria considered.

Social dynamics

Decision-making as defined in this issue is a social process that includes at least those actors involved in making the decision and those affected by its implementation. The social dynamics are relevant not only from the point of view of pragmatic ethics, considering that the confrontation of different values and ways of behaviour in specific conflicts (i.e., in situations that are important for the people concerned) gives the possibility to change old, accustomed ways of thinking and of behaviour into new, more adapted ones. This change gives the possibility to improve human life, especially if the confrontation is held under certain rules of an ideal discourse, i.e. mainly the equal right and possibility to participate for each concerned person. From a less philosophical point of view, environmental conflicts often imply the definition and allocation of property rights to resources not yet defined in society. Furthermore, social dynamics can determine the attainable outcomes to a large extent. The options within a process that allows for learning to take place and that enhances trust between the parties involved are obviously different from those from processes that do not allow for such social dynamics to take place.

The decision-making process can have considerable impact on the relationships between the relevant actors; this relationship might even be constituted through the decision-making process itself. Actors can include agencies responsible for implementing a decision, affected local communities, or factions in a community or within an agency (compare Moore, 1996, p. 163).

In this context, it is important to note that the dimension of relationship involves more than whether the different groups can somehow find an arrangement all the involved parties agree on. The quality of the relationship determines the range of possible solutions. In a setting with hostility and mistrust, the options for resolution are much more limited than in a setting characterised by mutual trust and a common quest for the best solution. Speaking in the language of game theory, this means a zero sum game may be turned into a win/win situation (compare Nicholson, 1991).

The experience with mediation and with approaches such as empowered deliberative democracy (Fung and Wright, 2001) seems to suggest that the type of resolution approach used can influence not only the solutions selected, but the range of options considered acceptable. Especially the construction of mutual trust and understanding of the interests involved leaves room for the participants to readjust their position in a conflict and thus increase the range of outcomes considered acceptable (compare Striegnitz, in this issue).

Closely related is the question in how far an approach allows for or even enhances the changing of perspective

or—more generally—learning. Changing of perspectives can refer to understanding the position of the other parties affected as well as developing one's own position in the course of the decision-making procedure.

If the approach should be able to give participants agency or ideally empower them, then information on the issue and the consequences is needed as a first step, but also enough time and freedom to acquire social competence during the process. Ideally, responsibility as a sign of active identification with the decision procedure is created or made aware through the process. This responsibility has two sides: it may show at the same time empowerment and agency, and may be a sign for an active appropriation of the outcome that can be decisive for the success of actually implementing a solution.

The issue of agency and empowerment is obviously closely interrelated with other criteria: by applying a decision-support tool, power relations are not put out of effect. Empowerment thus has a set of preconditions, some of which are reflected in other criteria. Interest representation is one such precondition, within the procedure fairness in the sense of possibilities to influence the agenda, the deliberation and the outcome for all participants (Webler, 1995), but procedural fairness is not enough. Participation can easily become an alibi, if compatibility with existing procedures is not taken into account. One possible approach towards empowerment can consist in mediated negotiation, where these questions are addressed much more explicitly than in participation—van den Hove elaborates this in her contribution to this issue (also compare Leeuwis, 2000).

The relationship and agency dimensions of conflict resolution are of special importance, where the resolution requires the continuing co-operation of the parties involved for actually implementing the decisions made, for example in protected area management.

Certain types of environmental conflicts, such as the co-operative protection of a biosphere reserve, require the creation of a consensus or at least convergence, others, such as fundamental conflicts in an early stage (e.g. the use of genetically modified organisms) are characterised by diversity, and their resolution might gain more from illustrating diversity. In some conflicts both aspects are important, e.g. at different stages in the process.

We suggest four criteria for identifying conflict resolution methods with regard to their potential for social dynamics:

- (1) how they affect the relationship of the actors,
- (2) whether there is scope for agency or empowerment of the actors,
- (3) whether they allow for the changing of perspectives or learning to take place,

- (4) whether they facilitate convergence and/or illustrate diversity.

Costs

Finally, within the last category we have summarized different aspects of costs. This refers to three aspects: the first concerns the above mentioned criteria of cost-effectiveness. This includes questions on how well a method is suited to find cost-effective resolutions for the conflict, i.e. how well it takes into account the available means and is able to help elucidate the costs and effects of different resolutions.

A second aspect is the cost of the method itself, which forms part of the entire costs. This has to be in proportion to the scale and type of conflict at stake. Incurring additional costs for conflict resolution should be justified by at least potential gains of providing additional options for resolution. It is also of some interest for the selection of the conflict resolution instrument, how its cost is shared among the conflict parties, state or third parties.

The third aspect subsumed here is an indirect type of cost and again is applied to the appropriateness of choosing an approach for a given conflict. We can define “decision failure costs” as the costs incurred due to a sub-optimal level of conflict resolution. These costs constitute potentials forgone and are obviously hard to determine in an exact manner. They can arise due to inadequate decision-making procedures, e.g. an approach that concludes a resolution too early without having considered interesting options. Another source for failure costs lies in how methods are applied. One relatively easy assessment is the robustness of methods: how much do they depend on good execution, does the method require excellent facilitators or can it be used by almost anyone.

We suggest three criteria for characterising conflict resolution methods with regard to costs:

- (1) whether they consider the cost-effectiveness of the proposed solutions,
- (2) whether they are expensive themselves in proportion to the conflict at stake,
- (3) to which degree they are sensitive to decision failures.

The article of Rauschmayer and Wittmer, in this issue, indicates how the adequacy of different instruments can be assessed on the basis of the proposed criteria. Such an assessment could consist of the following steps for each conflict:

- Determining which criteria are important in the conflict.
- Finding out how well a method or approach deals with these different criteria.

Based on this assessment adequate instruments can be selected. We would like to stress the potential of combining different tools and through this combination creating approaches which can draw on existing experiences, yet tailoring them to the needs of a specific conflict.

Contents of the issue

Contents

The issue is structured in four parts: after this editorial, participatory approaches for resolving environmental conflicts are presented in part two, case studies combining multi-criteria decision aid and participatory elements are presented in part three and part four contains an outlook and conclusions.

The question on “how to select instruments for the resolution of environmental conflicts” constitutes the ‘red thread’ of the issue. We structured the selection procedure a scientific adviser faces when she wants to choose the most appropriate instrument for resolving the respective conflict. In this extended editorial, we developed criteria for the evaluation of the different methods in order to determine, which one is most appropriate in a specific situation. The evaluation of methods will be taken up again in the conclusions (see below).

Participatory approaches as strategies for resolving environmental conflicts

In this part, different approaches for various contexts are presented using case studies: S. van den Hove conceptualises participation as a continuum between consensus seeking and negotiation of compromise and shows how this conceptualisation helps to better exploit the potential of participation when applying multi-criteria decision aiding (MCDA).

The following paper presents the Danish Consensus Conference and illustrates the process by presenting an application to the conflict of “consumption and environment”. L. Zurita shows the means through which the Consensus Conference builds a bridge between members of the public, stakeholders and experts. The paper draws on the world-wide experience with consensus conferences and discusses for which types of conflicts and in which contexts this approach is suitable.

The case of the German Wadden Sea (M. Striegnitz) is especially interesting since the successful mediation of conflicts concerning the enlargement of dams has in a second step led to the reformulation of the hitherto controversial legal base. The ‘good’ results of the mediation justified first experiments with ‘negotiated law-making’.

The cooperative discourse model of participation attempts to meet two major objectives: first, to enhance the competence in the decision-making process and, second, to assign a fair share of responsibility to manage environmental affairs to those who are or will be affected by the potential consequences. O. Renn presents this participatory approach that already integrates elements of multi-criteria analysis (MCA) successfully.

Mediated group modelling (P. Antunes et al.) enables stakeholders to jointly model ecological and social processes and thereby synthesise individual information to a common understanding. It was tested in a scoping exercise developed in the Rio Formosa coastal area, in Portugal. A proposal for a new methodology is presented in this paper, which consists basically in the expansion of the mediated modelling process, from scoping to decision making.

Case studies combining multi-criteria decision aid and participatory elements as a strategy for solving environmental conflicts

The experience with combining MCA and participatory tools is reflected by presenting case studies that cover a range of environmental conflicts, and apply different multi-criteria methods in combination with participative instruments. The case studies have been selected to illustrate potentials at different spatial levels. S. Stagl analyses the consultation process on national energy policy in Great Britain, more specifically a series of workshops which used MCA. She focuses on the change in preferences induced by the deliberative process. The case study by F. Messner et al. illustrates how the effects of global change can be included in the decision-making process of a water-management agency delegated by ministries from three federal states in Germany. Messner et al. integrate scientific models with their mathematically elaborate decision aid, where decision makers and stakeholders participate in the derivation of scenarios. Two different approaches that have been applied at the district level are presented: M.F. Norese reflects the use of ELECTRE III with the help of communication specialists in a participatory waste-treatment-siting problem. Finally, G. Munda uses water distribution in the City of Palermo as an illustrative example. Through philosophical reflections and an extensive discussion of strengths and weaknesses of different MCDA procedures, he argues for more attention to the social embedding of participatory MCDA.

Outlook and conclusions

In the outlook, A. Stirling identifies and discusses some of the open questions around the main topics of

this issue: how both analysis and deliberation are found to be similarly sensitive to different kinds of ‘framing conditions’; the role of participation in decision making, differentiating according to Fiorino between normative, substantive and instrumental approaches. He elaborates on the different functions appraisal assumes in different stages such as ‘opening up’ and ‘closing down’ wider policy discourses.

In their conclusions, F. Rauschmayer and H. Wittmer take up the criteria developed in this editorial and assess the potential of the different approaches with regard to different types and different levels of environmental conflict resolution. In order to take into account the context dependence of the application of the methods and of the conflicts, they match the criteria discussed in the editorial with an evaluation of the context specificity of the conflicts at stake.

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