2 Integrative Theory of Reflexive Dialogues

Martin Welp[1], Susanne Stoll-Kleemann[2]

1 University of Applied Sciences Eberswalde, Germany
2 Humboldt University of Berlin, Germany

2.1 The need for an integrative theory

The environmental problems of today's world are increasingly complex and include, among others, the loss of biodiversity, global climate change and water scarcity. Efforts to tackle these problems are exacerbated by uncertainties, facts under dispute, and varying values that lead to ongoing conflicts. We argue that as a consequence of the collapse of the fact/value-dichotomy, dialogues and the exchange of arguments become important at the intersection of science, society, and decision-making (see Putnam 2002). Stakeholder dialogues are one important approach to address these challenges. Experiences have been collected extensively by international organisations, research institutions, corporations, governmental agencies, as well as NGOs (Non-Governmental Organisations).

A key requirement for a practical theory relevant for stakeholder dialogues is that it integrates the different domains and layers of a dialogue (Jaeger 2003). Firstly, a dialogue is about exchanging arguments and creating common meaning. Secondly, dialogues also have a layer of personal relationships where trust building, empathy, antipathy, etc. play a major role.

In science we also face the challenge of attempting to build a bridge between an individual's mental model and conceptual/computer models, which may be used to create and test arguments. However, few efforts have been made to link these models with theoretical approaches. This is why the objectives and success criteria have remained unclear, and the dialogues as such have been exposed to criticism. This chapter outlines a conceptual framework based on the integration of selected scientific traditions on the one hand and on the evaluation of practical experiences on the other. We call this conceptual framework the Integrative Theory of Reflexive Dialogues. The new theory has practical implications for conducting stakeholder dialogues in environmental management, science and policy and for the development of appropriate tools. The concept of learning is the cornerstone of the integrative theory. It draws attention to

learning in groups and organisations, but also puts stakeholder dialogues into the broader context of social learning.

2.2 The conceptualisation of the Integrative Theory of Reflexive Dialogues

The lack of a conceptual framework has affected the practice of stakeholder dialogues and the evaluation of the processes and outcomes. Therefore we have made an attempt to select the most relevant theoretical approaches and synthesise them. The relevance of a particular theory depends on the angle the scientist wants to choose and his or her worldview. Our selection criteria have been influenced by practical experiences with various kinds of dialogues and our own intellectual and professional background in the field of sustainability science. A more pragmatic selection criterion is the applicability of a particular theory for tool development.

For our purposes, the three most relevant theoretical backgrounds are social psychological approaches, organisational learning, and formal mathematical approaches for decision support. Social psychological theories were chosen because they cast light on issues such as group processes, social identity, communication, and perception barriers. Organisational theory - and especially organisational learning - is useful for understanding and fostering dialogues in teams and groups. Systems thinking is a key feature for organisational learning because it helps to identify factors that influence the behaviour of the system and its potential change. The third approach establishes links to mathematical representation of stakeholders' assessments that can help to structure debates on complex issues (Welp et al. 2006a, b). The three theoretical approaches are discussed in detail in sections 2.3 - 2.5. In section 2.6, we briefly summarise some other important theoretical traditions. Section 2.7 synthesises the above-mentioned approaches to the new Integrative Theory of Reflexive Dialogues.

Thus, the new theory unifies what has so far appeared to be unrelated and disparate. By linking these theories in a meaningful way, we expect to link various facets of stakeholder dialogues, which cannot be tackled adequately within the confines of a single theory. Such a theory is expected to contribute to tool development in a much more substantial way than others have done so far. A combined use of different tools, for example, by linking formal representation of stakeholders' assessments

(analytical tools) with procedures for group work (communication tools) will address the deficits outlined above.

2.3 Social Psychological Theories

2.3.1 Impacts of group diversity and group processes on stakeholder dialogues

To understand better what determines the functioning of stakeholder dialogues in natural resources management, it seems to be useful to consider social-psychological theories, which explain how attitudes, outlooks, and behaviour are shaped in these processes (Stoll-Kleemann 2003). The major drivers that influence stakeholder dialogues from a social-psychological viewpoint are group diversity together with group processes encouraging social identity.

Stakeholder dialogues usually consist of participants who belong to different groups. Therefore, stakeholder dialogues are characterised by high group diversity, which is especially the case in the fields of our book, namely Natural Resources Management and Integrated Assessments. Diversity can be framed in terms of cultural diversity or diversity characterised by different demographic characteristics such as gender, age, education, income, etc.

Enayati (2002) emphasises that it is important to note that NGOs, the academic world, business and industry, indigenous peoples, trade unions, and the like are also "cultures" that can differ with regard to cultural characteristics. In the framework of stakeholder dialogues, she furthermore suggests a view of culture as "the way we do things around here". Members of a culture understand those ways and generally honour them, although without necessarily being conscious of doing so. Enayati (2002: 86) concludes that since stakeholder dialogues "bring people with different cultural orientations into interaction with one another, sensitivity to cultural differences is essential and involves awareness of norms (standards of behaviour) and beliefs (assumptions about the way things are) and values (standards of importance) on which the cultural norm are based".

Stakeholder dialogues are initiated in order to create new knowledge, and due to the diversity of participant perspectives, this outcome is easier to achieve than by individuals working in isolation. Triandis et al. (1965) notes that a diverse group provides a more comprehensive view on possible issues on the agenda. Diverse groups offer immense potential for

increased quality of group performance, knowledge creation and innovative decision-making (Jackson 1996, Pavitt 1993, Phillips and Wood 1984, Seibold 1999). The direct involvement in such processes is likely to lead to a change of attitudes and to individual commitment. However, benefits from group diversity in stakeholder dialogues are not automatic.

Group membership itself is an important feature that has to be considered in a theory of reflexive dialogues. Internal bonding processes within social groups (NGOs, scientists, managers, etc.) may account for a decisive rejection of a technically correct compromise. An explanation for expressing more negative attitudes toward a certain issue in stakeholder dialogues may lie in group expectations regarding the roles of the stakeholders involved (Stoll-Kleemann 2001a).

Social psychologists have long looked at the effects and consequences of how people treat members of their own group compared with members of other groups to which they do not belong or identify with; their research takes on two perspectives. The first is where two or more groups are in competition for resources (Sherif 1966) ("Realistic group conflict"), and the second is "how group membership per se affects a person's attitude and behaviour" (Pennington et al. 1999: 326). The latter is the Social Identity Theory[1] (Tajfel 1978, Tajfel and Turner 1979) and provides a better explanation of group-related aspects of stakeholder dialogues.

The basic assumption of Social Identity Theory is that social categorisation results in social discrimination because people make social comparisons between in-groups and out-groups. The four main concepts of Social Identity Theory are social categorisation, social identity, social comparison and psychological group distinctiveness (Tajfel 1978). This distinction between "in-group" and "out-group" suffices to provoke the rejection of the out-group without any competition for resources existing among the groups (Stoll-Kleemann 2001a). Tajfel and Turner (1979: 46) point out that in practice "it is nearly impossible in most natural social situations to distinguish between discriminatory inter-group behaviour based on real or perceived conflict of 'objective' interests between the

---

[1] Tajfel and Turner (1979: 34) emphasise that the Social Identity Theory is "intended not to replace the Realistic Group Conflict Theory, but to supplement it in some respects". For an adequate social psychology of inter-group conflict, they regard it as essential to focus on "the processes underlying the development and maintenance of group identity and possibly autonomous effects upon the in-group and inter-group behaviour of these "subjective" aspects of group membership" (ibid: 34).

groups and discrimination based on attempts to establish a positively-valued distinctiveness for one's own group".

Social Identity Theory further states that people make social comparisons because they need to provide themselves with a positive identity (Tajfel 1978, Tajfel and Turner 1979, Turner 1982). Positive social identity is important for a person since it enhances self-esteem and self-worth. Comparisons made between in-groups and out-groups in relation to status, value, and perceived worth lead to social competition. This reflects people's desire to put the groups with which they identify in such a light as to believe their group is "better" than the out-group (Pennington et al. 1999, Turner 1982). Membership in a group relates to external criteria (e.g. being a business leader or representative of an NGO). Furthermore, identification with this group depends on internal criteria, among them cognitive factors (like the awareness of being a group member), evaluative factors (like the social prestige of group membership), and emotional factors (like positive or negative feelings associated with group membership). In this context, Turner (1982: 27) suggests that in order "to understand how social groups are formed", one should also focus on variables such as "common fate" or "shared threat" (ibid: 27).

One lesson that can be learned from social dilemma[2] research in this context is that people in such situations "attend more to the groups' payoffs than to their own, either automatically or to behave appropriately". But whereas social identity elicits co-operative behaviour in dilemmas, it is generally only for the benefit of an "in-group". "Dilemmas between groups (requiring self-sacrificial behaviour within) are often the most extreme. Consequently the framing and manipulation of group identity is critical to co-operation rate" (Dawes and Messick 2000: 111). When people act as individuals who are interacting with other individuals, they are far more co-operative than when they form groups that interact with other groups (ibid: 114).

There is overwhelming evidence that "favouring the in-group over the out-group is extremely common in inter-group relations" (Turner 1982:34, see also Doise 1978, Tajfel 1978). Negative values and exaggerated stereotypes, are attributed to the out-group, while the in-group is perceived to have positive characteristics and values (Pennington et al. 1999).

---

[2] In social dilemma situations, each individual always receives a higher payoff for defecting than for co-operating, but all are better off if all co-operate than if all defect (Dawes and Messick 2000).

2.3.2   Stereotyping as a limiting factor for group learning

The fact that stereotypes of out-groups are one important consequence of social identity processes has been alluded to in the foregoing section. A social stereotype is "a set of beliefs about the personal attributes of a group of people" (Ashmore and Del Boca 1981: 30). Such sets of belief are "activated" (that is, start influencing perception in a given situation) through identification of an individual's group membership (Enayati 2002). All members of the out-group are seen as possessing those stereotypical characteristics, and the individual's unique personal characteristics are ignored (Pennington et al. 1999). Stereotypes are usually highly simplified images, and those that refer to out-groups are often of a derogatory nature and based on, or refer to, clearly visible differences between groups, e.g. in terms of physical appearance (Hogg and Vaughan 1998). From this description of stereotypes, it can be seen that they are similar to prejudicial attitudes that people hold about social groups. A person holding a stereotype will show a tendency to note and recall subsequent information about the social group that fits the stereotype (Pennington et al. 1999).

For example conflicts between business leaders and environmental NGO representatives in stakeholder dialogues have to be understood in the context of these stereotyped relationships between environmentalism and other social and economic interests. They are extremely difficult to modify when social tensions and conflicts have arisen among groups (Hogg and Vaughan 1998). Recent research has acknowledged that stereotypes have both cognitive and emotional undercurrents that inflame judgements about social groups. Situations which include strong, negative emotions, such as anger or anxiety, have been found to increase a person's use and reliance on stereotypical thinking (Mackie and Hamilton 1993, Pennington et al. 1999). Therefore, on the one hand, stereotypes can negatively affect communication among opposite groups but on the other hand, according to Enayati (2002), it is important to note that stereotyping is not just a "bad habit"; it is inherent in our cognitive structure. It makes our perception quicker and more economic; we simply cannot meet everybody as a completely "new person", a blank sheet. Nor are stereotypes necessarily completely wrong. Having our perceptions and expectations shaped through stereotyping can indeed have positive effects.

As discussed, stereotyping does not necessarily imply negative evaluation but often it does, and then it implies social prejudice (negative attitudes) and discrimination (negative behaviour): people are judged negatively merely because they belong to a certain social group. Impacts on behaviour can include avoidance, exclusion, fear, and aggression. It is

important to note that being discriminated against can elicit "counter-discrimination" and hence further increase distance between social groups (Hemmati 2002).

It is difficult to change attitudes based on stereotypes because information concerning the features on which the stereotypes focus are absorbed and processed in a very one-sided manner. For example, stakeholders such as political decisions-makers, business leaders, and environmentalists select sources of information, e.g. about climate change, from which they can expect (e.g. because the title of a journal article seems to promise it) that their current attitudes, values and knowledge will be confirmed. As mentioned above, the attitudes, values and emotions of business leaders and environmentalists are sometimes biased against each other. Therefore they seek information that reinforces this bias, while challenging the credibility of any information that contradicts their attitudes. Values and emotions act as powerful criteria for the selection and processing of information (Lantermann and Döring-Seipel 1990, Ernst et al. 1992, Lantermann et al. 1992). Especially in conflict situations, values and emotions have a negative influence on learning and mutual understanding and thus have a negative impact on the quality of the outcomes of stakeholder dialogues.

However contact with members of the stereotyped group might be the first step in overcoming stereotyping if it happens repeatedly and with more than one "typical" group member (Pettigrew 1989). In many cases, the best strategy to overcome prejudice has proved to be to engage both groups in a common activity, e.g. working together. Particularly if the activity is successful, it can significantly contribute to reducing prejudice and improving relations between different groups (Sherif and Sherif 1953, Smith and Mackie 2000). Such processes have to be taken into account when searching for adequate strategies to deal with environmental problems in stakeholder dialogues and for creating a reflexive theory of stakeholder dialogues.

A different danger in the information-gathering process in stakeholder dialogues can arise when information is held by only one member of the group and this information is ignored, e.g. because of the relatively low status of that person. Research on social influence and conformity indicates that when a person's private judgement differs from the opinions expressed by others, that judgement is soon abandoned, even when it proves to be verifiably correct. However, in the presence of just one other person who agrees with them, people persevere in the face of opposition (Asch 1956). Also, just as an individual is likely to lack confidence, the group may lack confidence that, in an ambiguous situation, a deviant opinion could be correct. The evidence suggests that for diverse groups to

fulfil their potential, group members should have overlapping areas of expertise instead of a sole expert for each relevant knowledge domain (Jackson 1996). This is a challenge for the selection of the right stakeholders.

2.3.3 The Theory of Psychological Reactance

A further well-known social-psychological theory has to be considered in the Reflexive Theory of Stakeholder Dialogues. Brehm's Theory of Psychological Reactance provides a useful explanation of why stakeholder dialogues and public participation are very important instruments to avoid reactance that is counter-productive for the implementation of sustainable development strategies (Stoll-Kleemann 2001b).

The theory states that reactance arises when personal rights to decide and act are threatened, reduced, or eliminated, for example via regulations, prohibitions and controls (Brehm 1966). This is restricted to behaviours where the person – i.e. from his or her subjective perspective – has a perception of being threatened. If people feel restricted in their influence on decision-making, this can provoke reactance and arouse efforts to gain more influence (Stoll-Kleemann 2001b).

This means that a lack of inclusive and meaningful participation is an important factor that hinders the implementation of sustainable development strategies (Scheffran and Stoll-Kleemann 2003, Stoll-Kleemann and O`Riordan 2002a, b). This can be seen in close connection to the Theory of Psychological Reactance because if decisions are taken without the involvement of affected citizens, reactance can occur (Stoll-Kleemann 2001a, b). The lack of a continuous dialogue and "real" communication between the involved citizens in which various interests and points of view may be understood and accommodated, developed and resolved in face-to-face discussions is especially problematic. Findings from psychological social-dilemma research confirm this evidence in the field of water conservation. These findings suggest that people are more willing to support authorities when these authorities use fair decision-making procedures (Tyler and Degoey 1995).

To summarise the social-psychological dimensions of stakeholder dialogues, it is important to note that processes within them, such as communication, are not merely rational processes and should not be approached as such (see also below "bounded rationality" and "mental models"). Instead "people's feelings, attitudes, irrationalities in information processing, and so on, need to be taken into account and respected" (Enayati 2002: 8, Stoll-Kleemann 2003). While the discussions

within stakeholder dialogues need to be based on factual knowledge, trust building is also clearly an essential prerequisite for successful stakeholder dialogues. Overcoming prejudice and stereotyping can be framed as a learning process that will lead to people being able to truly "dialogue" (Enayati 2002). It is a process based on interaction between participants that takes time to evolve.

2.4 Theories of Organisational Learning

Learning[3] is indeed one of the key concepts for stakeholder dialogues and participation. An important question in this context is how groups and organisations learn and how inter-organisational learning can be organised. In stakeholder dialogues and participation, representatives from a wide range of organisational backgrounds and professional cultures meet to debate an issue at hand. A new action-oriented, theoretical framework for public participation and stakeholder dialogues thus needs the input of organisational theories. Management science and organisational learning have greatly influenced business practices in the last decade (Senge 1998), but have in practice been largely neglected in global change research. Organisational learning has been influenced by various scientific traditions, most prominently by psychology, cultural studies, sociology, economics, and history. A primary challenge is to find out how people can work together effectively for the period during which they are together.

A paradigm shift[4] has taken place from rigid hierarchies to an emphasis on working in networks. These organisational innovations have relevance for stakeholder dialogues. Underlying this new perspective on organisations (Wheatley 1992) has pulled together the insights of systems thinking from various academic disciplines and developed recommendations for organisational development theory and practice on that basis. The conceptualisation of organisations based on systems thinking takes the human capacity for purposeful behaviour, reflection, and learning as a starting point. People in a system need shared purpose and meaning in order to make sure that their individual actions are in tune with the system as a whole. This requires visioning, commitment, and passion

---

[3] For a more thorough and partially complementary discussion of theories of learning and their application in the context of stakeholder dialogues, see Chapter 6 of this book (Maarleveld et al. 2006).

[4] For a detailed overview of the paradigm shift within organisational theories see Oels (2003: 43-47).

for the shared purpose (Pratt et al. 1999). Systems thinking is a key concept in Senge's conceptual framework, which is described below.

Management practice within organisations has in recent decades been greatly influenced by systems thinking. Senge (1998) has described it as the essential 'fifth' discipline for organisational learning. The other four disciplines are mental models, shared visions, team learning and personal mastery. In Senge's systems-dynamics approach, attention is paid to dynamic complexity (i.e. how patterns change over time) rather than detail complexity (i.e. full detail at any one point in time). According to Senge (1998), "the real leverage in most management situations lies in understanding dynamic complexity, not detail complexity." Dynamic complexity implies that interrelationships consist of positive and negative feedback loops and not only linear cause-effect chains. Instead of focusing on short-term effects only, individuals and organisations should become aware of how the effects of actions change over time (Senge 1998). A 'quick fix' addresses only the symptoms, while the underlying fundamental cause remains unaltered. In a longer time range, this 'shifting the burden' structure may worsen the situation. According to the systems-dynamics approach, learning means understanding the complex relations of social systems and their dynamics.

Mental models are deeply held internal images of how the world works. These images can be so powerful that they limit us to familiar ways of thinking and acting. They are especially powerful because they shape our perception. Thus, the discipline of management of mental models is about questioning, testing, and updating these images. In stakeholder dialogues, mental models should be made explicit. Understanding the basic assumptions and worldviews the other person holds is key to accepting the other person's position. If mental models are made explicit, others can challenge them. The business world has applied different ways of institutionalising reflection on mental models. Scenarios, mapping mental models, computer simulations (Sterman 2002), and other tools usually deal with non-quantifiable variables and can be used in the context of stakeholder dialogues as well. We will come back to mental models and a specific application of them in Bayesian Networks in the following section.

The development of shared visions (which differ from consensus) is important for organisations and increases their capabilities to focus their activities. As mentioned earlier, a consensus may be the objective of a stakeholder dialogue. In scientific dialogues for example, exploration of different views and dissent may be a relevant result, too. In stakeholder dialogues, consensus on an issue may be achieved even though the participants do not share the same vision.

Besides systems thinking, mental models, and shared vision, Senge (1998) emphasises team learning as one of the key disciplines in organisational learning. In the context of stakeholder dialogues, team learning is highly influenced by the mode of the communication. David Bohm's distinction between discussion and dialogue is useful in this respect. As outlined in Chapter 1, in discussions, individual views are presented and defended. Discussions can be seen as a ping-pong game: the subject of common interest is analysed from many points of view; the purpose of the game is normally to win (Bohm 1996). Winning means having one's view accepted by the group. The basic goal of participants in a discussion is for their view to prevail. In a dialogue, in contrast, the participants are not negotiating positions or trying to reach a consensus. Dialogues are based on mutual respect and on the notion that the others have a valid viewpoint. The word dialogue suggests a free flow of meaning between people. In dialogue, individuals gain insights that cannot be achieved individually. Thus dialogues foster interdisciplinarity and a holistic view. The concept of dialogues resembles Habermas' ideal speech situation (see section 2.6).

Necessary conditions for a dialogue are that (a) participants treat one another as colleagues, (b) that they "suspend" their assumptions, and (c) that the process is structured by a skilled facilitator. Treating one another as colleagues in practice requires that normal in-group/out-group thinking is put aside and that stereotypes do not create barriers between participants (see section 2.3.2). Suspending assumptions means to hold them as if they were 'hanging in front of you', constantly accessible for questioning and observation. It does not mean throwing the assumptions away or suppressing them. By holding assumptions up for examination, the involved indiduals can learn about their own mental models and the mental models of other participants.

Both Senge (1998) and Bohm (1996) argue that a group can achieve and be more than simply a sum of its parts. This requires, however, that the participants go beyond merely trying to convince each other of their personal views and positions. This kind of communication is not easy to achieve, and it requires trust building and usually some time. According to both Bohm (1996) and Senge (1998), there is a place for both discussions and dialogue. The power of the approach lies in the combination of both. It is however useful to be clear about the right timing of the two.

Senge's (1998) five disciplines have been highly influential in business practices and learning within companies and other organisations. For participation and stakeholder involvement, systems thinking, mental models, and team learning (i.e. the difference between discussion and dialogue) are of particular relevance. Unlike learning within organisations, participation in stakeholder dialogues involves learning between

organisations and individuals with different backgrounds. Learning between organisations is a challenging effort for a number of reasons: First, the opportunities for regular interaction are rarer and the process of trust building may thus take longer. Second, unlike a company, which may be able to create a common vision of its activities in a short period of time, a multi-stakeholder dialogue faces the challenge of dealing with a multitude of interests. Third, creating a shared language requires flexibility and some time.

Organisational learning is a relatively new and heterogeneous field of inquiry. Among the wide range of perspectives, we find systems approaches, cognitive approaches, communicative approaches, and cultural approaches. For our purposes - developing a practical theory of stakeholder dialogues - the systems approach seems most promising. In Senge's view, systems thinking is the essential discipline, but his other disciplines have great relevance for stakeholder dialogues as well. For a more detailed discussion of this and further theories of learning and related analytical frameworks (e.g. Kolb´s learning cycle or the learning loops of Argyris and Schön) and their practical application in stakeholder dialogues in natural resource management (e.g. GIS-assisted learning in planning), see Chapter 6 (Maarleveld et al. 2006).

2.5   Formal approaches

2.5.1   Are stakeholders rational actors?

A formal representation of stakeholders' assessments seems to be useful in complementing the theoretical framework for stakeholder dialogues and public participation. Although ordinary language is indispensable in exchanging arguments, advancements in mathematics and computer tools open attractive paths to explore. We believe that the diversity of stakeholders' perspectives can be captured by a formal representation of their preferences and mental models, and that a formal approach offers several advantages. First, the language used is close to that of systems dynamics and modelling. Mathematical models can handle complicated descriptions of how variables relate to each other. According to Cain (2001: 11) the "down side of using a mathematical model is that it is hard for people not involved in its construction to understand it". Second, a formal representation forces clarity in making statements in order to reduce ambiguity. Third, models of how humans or social groups behave or how the formation of expectations takes place can be coupled with

modules describing natural systems, socio-economic systems, etc. The disadvantage is that some formal representations may be simplistic and reduced, and that many nuanced aspects of the topic that can be described in words are lost.

The theoretical backgrounds of these formal representations are two-fold: The first is Rational Choice Theory, in particular the Rational Actor Paradigm (RAP), which has been influential in neo-classical economics and sociology in particular because it uses a mathematical language to represent preferences and the behaviour of individuals and groups. Rational Choice Theory (including Game Theory) has frequently been applied, e.g. to analyse negotiation situations. At the core of this theory is that rational actors can choose between different possible actions and order different consequences of possible actions according to their preferences. In a decision-making situation with many actors, the possible actions available to each of them depend on parameters of their joint situation. Rational actors choose a possible action that, depending on their preferences, is optimal given the parameters of the situation (Jaeger et al. 1998). Von Neumann's and Morgenstern's (1944) expected utility axioms and their rational choice model were developed to describe how actors should behave if they were about to act rationally. According to the expected utility theory (EUT), by assessing the probability of different outcomes, actors try to maximise the expected utility taking into account that some are risk averse while others are risk seeking. In stakeholder dialogues, such questions can be of interest as well.

The second theoretical background is called "Bounded rationality", which is the key concept of the so-called "behavioural approach". Since real world actors do not have perfect knowledge of the costs and benefits of different alternatives, as postulated in rational choice theory, they are bound to make decisions under uncertainty. Psychologists, the best known in this field are Kahneman, Slovic, and Tversky (Kahneman et al. 1982) have identified several biases that influence human decision-making because of cognitive limitations and also organisational pressures. As a result, many decisions turn out to be incorrect; choosing the best course of action is just too complicated. Therefore, they have to use reduced mental models of the world (Simon 1957) (see also the description of cognitive limits in section 2.3 and the definition of Senge in section 2.4 and Sterman 2002).

According to Sterman (1991: 2) "Mental models have some powerful advantages. A mental model is flexible: it can take into account a wider range of information than just numerical data; it can be adapted to new situations and be modified as new information becomes available. Mental models are the filters through which we interpret our experiences, evaluate

plans, and choose among possible courses of action. The great systems of philosophy, politics and literature are, in a sense, mental models."

It is again Sterman (1991) who emphasises that there are also problems associated with mental models. "They are not easily understood by others; interpretations of them differ. The assumptions on which they are based are usually difficult to examine, so ambiguities and contradictions within them can go undetected, unchallenged, and unresolved" (Sterman 1991: 2). Surprisingly, we are also bad at constructing and understanding our own mental models or using them for decision-making. Psychologists have shown that we can take only a few factors into account in making decisions, which leads to usually extremely simple mental models (Kahneman et al. 1982).

Therefore it seems to be useful, considering this theoretical concept of mental models in stakeholder dialogues, to use certain tools as described below to overcome - or at least deal with - the given limitations. These tools offer improvements insofar as they are assigned to have a clear purpose to solve a particular problem. They make assumptions explicitly open to all for review. These approaches make it possible to interrelate many factors simultaneously. The usefulness of the tools/procedures explained below lies in the fact that they simplify reality, putting it into a form that we can comprehend. In the following, we will focus on Bayesian learning and then multi-criteria decision analysis.

2.5.2   Bayesian learning[5]

Bayesian learning seems partly to be a departure from RAP in its original version (i.e. in RAP there is no place for learning since, as mentioned above, actors have complete information and preferences do not change). Models based on Bayesian learning may, however, better represent true human behaviour, primarily because agents have limited information storage capacity. Similar to Game theory, Bayesian learning acknowledges uncertainty and operates with probabilities.

One definition of Bayesian learning reads as follows: "Bayesian learning constitutes a probabilistic view of learning based on Bayes' Theorem. The underlying assumption is that there is a set of hypotheses, each having a certain probability of being correct. Receiving more information changes the probabilities from a learner's point of view. For instance an observation might contradict a hypothesis or strengthen the

---

[5] This subsection is a modified and shortened version of the analogous subsection in Welp et al. (2006a).

belief in it. The aim in this setting is to be able to find a hypothesis with the highest probability of being correct, given a specific set of data / piece of information" (University of Dortmund 2006).

Box 2.1

Bayes' theorem is a result in probability theory. Bayes' theorem gives the probability of a random event *A* occurring given that we know a related event *B* occurred. This probability is noted *P(A/B)* and is read "probability of *A* given *B*". This measure is sometimes called the "posterior" since it is computed after it is known whether *B* is the case or not.

Bayesian belief network: a graphical tool to help make decisions under uncertainty. It can be used to build a Decision Support System (e.g. a Bayesian Expert System). Bayesian networks are composed of three elements: a set of nodes representing system variables, a set of links representing causal relationships between the nodes, and a set of probabilities, for each node specifying the belief that a node will be in a particular state given the states of those nodes that can affect it directly.

Bayesian learning: the process by which a Bayesian belief network updates its set of probabilities (so-called conditional probability tables) as a result of receiving case data about variables in the table.

Adapted from: Cain (2001), Wikipedia

Bayesian learning is represented in mathematical terms in the following way. In a simple example, suppose there are two states of the world *s* and *s'*. Agents are unsure which of them is the actual or true state of the world, but at time *t*, the ith agent attaches probability $z_i(t)$ to *s'* being the true state of the world and thus believes *s* to be true state with the probability *1-$z_i(t)$*. Beliefs are thus captured in the single parameter $z_i(t)$. In the light of their beliefs, the agents choose a particular course of action. Having acted, they observe a result, which is called *X*. Based on this, they update the probabilities of s' being the true state of the world (Breen 1999). The Bayesian mechanism provides a plausible way in which beliefs can change over time, a process called belief updating.

Developing RAP further and applying the concept of Bayesian learning in particular seem to be promising paths for advancing the stakeholder dialogues in natural resource management. Three main areas of relevance can be found: (a) framing problems, (b) finding differences and inconsistencies, and (c) addressing the question of how actors learn.

Framing problems

Environmental policy-making is often faced with factual uncertainty and political controversy. In conflict literature, this is described as issues being at dispute and values being subject to conflict. Because natural resource problems tend to be complex and subject to both factual uncertainty and conflicts over values, they are not easy to frame in a meaningful way. The inability to construct well-formed problems hampers efforts to find mutually acceptable solutions.

Empirical studies have shown that the framing of an issue by using a positive or negative description (e.g. would you invest in a medicine that saves 70% of the patients? vs. would you invest in a medicine when 30% would still die?) has a strong influence on the answers people give (Gardner and Stern 1996). Other studies have attempted to show how citizens perceive certain complex issues (are there wrong, imprecise, or irrelevant beliefs?), and how risk communication can take these insights into account when aiding the public's understanding about complex issues (Bostrom et al. 1992). Wynne (2005) on the other hand turned the problem upside down and argued that public misunderstanding, mistrust, or scepticism regarding scientific discourse on risk may in fact relate to the way risk issues are defined and the risk discourse constructed, which excludes citizens' views and perceptions.

The author further believes that participation processes and framing methods developed to deal with the resistance of the public or to educate citizens solely focus on downstream risk issues (e.g. risk and impacts of a new technology). They furthermore deny citizens the ability and the possibility to address essential social debates (upstream issues – which human purposes drive science and innovation?).

In this context, one application of Bayesian learning is the use of Bayesian belief networks to visualise the structure of our present knowledge and thus come up with an accepted problem definition. The Bayesian formalism allows for subjective probabilities, which is of interest in stakeholder dialogues. Imprecise information on complex systems can be presented by proceeding from a simple influence diagram to a causal network containing system components (nodes) and causal dependencies (links or arcs). The probabilistic concept underlying a Bayesian approach acknowledges the uncertainty of data and of the conceptualisation of problems and is more likely to be accepted by stakeholders than single predicted results.

Finding differences and inconsistencies

Finding an agreement about an issue may be easier if subjective probabilities and assessments are made explicit. Here Bayesian learning can also be useful since it helps to identify inconsistencies in people's thinking. Key experts and decision-makers may have widely different and inconsistent explanations of the problems at hand or opinions on the course to adopt. Bayesian expert systems can, for example, be applied to help structure the debate on various natural resource management problems such as the exploitation of marine resources (see example below).

Thus a structuring process can greatly benefit from the use of Bayesian belief networks. Cain's (2001) illuminating guidelines provide concrete steps to capture and represent the world as described by different stakeholders in simple conceptual models. Stakeholder interviews or group discussions are conducted to elicit expert information and various subjective probabilities. The stakeholder groups can be very small and, e.g., include members of industry, NGO representatives, and lay people. Stakeholder elicitation may take place by conducting semi-structured interviews and group discussions (if appropriate). It is good to start building a Bayesian network by beginning to think of the variables in certain categories. Cain suggests distinguishing between the following six categories of variables as a starting point for a network structure: objectives, interventions, intermediate factors, controlling factors, implementation factors, and additional impacts. Stakeholder Bayesian networks (BNs) are created. A BN is basically a set of nodes representing system variables and a set of links representing causal relationships between these nodes (see Figure 2.1). At a later stage, stakeholder Bayesian networks can be simplified and merged to master BNs.
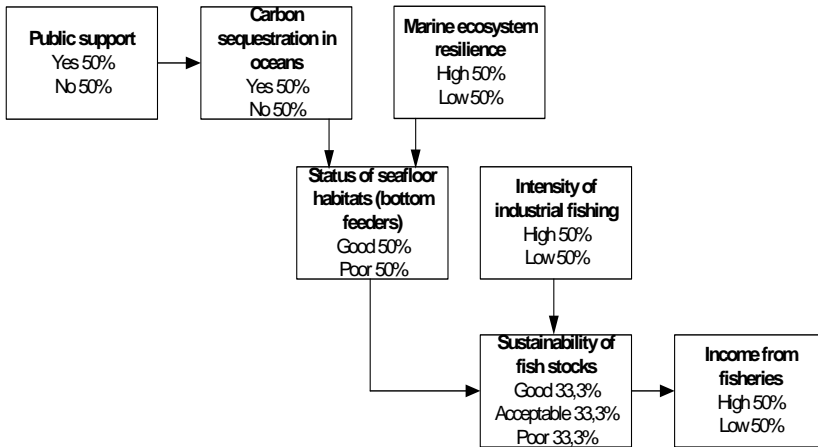
Fig. 2.1. A simple Bayesian belief network

In a next step, Conditional probability tables (CPT) are created: a set of probabilities, one for each node, specifying the belief that a node will be in a particular state given the states of those nodes that affect it directly (its parents). In other words, CPTs express how relationships between nodes operate (see Table 2.1). Each row in a CPT implies a question. Using the belief network in Figure 2.1 as an example, we can ask the following question: "If the status of seafloor habitats (bottom feeders) is poor and the intensity of industrial fishing is high, what is the chance that sustainability of fish stocks is acceptable?" If it appears to be difficult to frame these questions, then it is likely that the master BN is illogical. The structure or the states of the nodes have to be subsequently altered.

Table 2.1. Conditional probability table (CPT) of an imaginary stakeholder.

Intensity of industrial fishing:	Status of seafloor habitats:	Sustainability of fish stocks:		
		Good	Acceptable	Poor
Low	Good	0.60	0.40	0.00
Low	Poor	0.00	0.10	0.90
High	Good	0.40	0.60	0.00
High	Poor	0.00	0.00	1.00

As mentioned above, Stakeholder Bayesian networks can be simplified and merged to master BNs. When the master BN is completed, it can be turned into a fully functioning BN that can be used to help make decisions and to carry out further dialogues with stakeholders. This is done by filling

in the CPTs using the best and most appropriate data or expert judgement available and by manipulating the BN (i.e. by changing probabilities).

By building an expert belief system and reviewing it together with stakeholders, a better picture of the problems at hand can be obtained. The whole exercise provides the involved scientists and stakeholders an opportunity to reflect on their basic assumptions, revise their views and learn as individuals and as a team. Such a procedure will reveal gaps in current knowledge and thus point at new research questions.

Expert belief systems can be used to develop empirical explanations (a causing b with a certain probability) but also normative argumentation. Thus both factual uncertainty and conflict about values can be addressed. This helps to identify areas where agreement can be found and where disagreement over issues or values prevails. The possible fields of application encompass a broad range of decision-making situations ranging from natural resources to business management decisions.

How do stakeholders learn? – Constructing a model of learning

As mentioned above, an important aspect of Bayesian learning is that the update of beliefs when new evidence occurs is possible. This takes place formally by experts changing the probabilities of a statement being true (see Figure 2.1). An application of Bayesian learning could be to study "how and on what basis stakeholders update their beliefs when confronted with new, albeit uncertain insights?" It becomes possible to develop formal models of how stakeholders or 'agents' learn. Such models, even though they may remain anecdotal, explicitly aim at simulating more realistic present and future behaviour, such as consumer behaviour, investment decisions, or positions in negotiations. Research in this area, although crucial to improving current research on natural resource problems, is still in its infancy. Agent-based modelling is one approach that is actively being developed and experimented with in sustainability science (see Scheffran 2006, Chapter 5 of this book).

What is the practical relevance of such approaches for stakeholder dialogues and public participation? The method presented above seems promising for exploring stakeholders' mental models and in turning qualitative descriptions into simple quantitative assessments. Each individual's mental models may first appear alien to others, but the visual representation helps them understand the differences. Mental models become clear by interviewing stakeholders and aggregating their views to a Bayesian expert system. The wide application of the approach in tackling management problems and bringing together stakeholder views with scientific models suggests that such an approach helps to identify

inconsistencies and differences in stakeholders' assessments. Bayesian learning can be used to develop Internet-based stakeholder tools, such as an Internet-based Bayesian learning model that can be updated online by stakeholders (Ames and Neilson 2001). An encouraging feature of Bayesian networks is that several time steps can be built into the system. Thus, interventions in a management system can be explored in an iterative way.

2.5.3 Multi-criteria decision analysis

Multi-criteria decision analysis (MCDA) is increasingly being used to help resolve emerging goal conflicts in areas such as natural resources management in particular and environmental assessment in general (Jentsch et al. 2003). In stakeholder dialogues, this approach can have a similar structuring effect as the analysis of mental models (cf. Bayesian learning). In a process that uses MCDA, both objectives and measurable criteria are identified to assess the extent to which these objectives are met. Different kinds of objectives can be included, expressing not only economic values but also addressing goals that cannot always be expressed in monetary terms, such as biodiversity, equity, or minimising risk and uncertainty. The factors of a solution are not fixed values but are variable or fuzzy within certain ranges determined by resources availability and socio-economical realities (IIASA 2004). MCDA tools usually provide an explicit relative weighting system for various criteria. In contrast to cost-benefit analysis, where all positive and negative effects are aggregated to a single monetary unit, MCAs are better suited to cope with the fact that not all impacts can be measured using the same unit. Disaggregation thus helps to make explicit what different alternatives mean for different groups.

There are crucial differences between the Bayesian networks and MCDA analysis: MCDA analysis represents only decision criteria, while Bayesian networks help to understand the underlying working of a system. Stakeholders can easily understand the hierarchy of decision criteria, which is a basic concept of MCDA. Cain (2001) argues however that this can sometimes restrict the ways in which stakeholders express themselves. Multi-criteria analysis and Bayesian Networks are thus approaches that are attractive for stakeholder dialogues in natural resources management, especially if there are groups involved whose interests vary greatly.

There is a wide range of MCDA approaches, including commercial software packages. For a detailed description of various tools, see Dogson

et al. (1999). In the following, some aspects of MCDAs are highlighted that are relevant for a conceptual framework of stakeholder dialogues.

MCDA can be used for finding areas where stakeholders' interests converge and could potentially lead to building coalitions. One example is NAIADE as an MCDA tool that has been applied in practical management situations (O'Connor 2000). Another software package is the Aspiration-Led Decision Support (ALDS) approach developed at IIASA (International Institute for Applied Systems Analysis). This tool is oriented towards an interactive mode of operation in which a sequence of problems is solved under varying conditions (e.g. different objective functions, reference points, values of constraints and bounds). It also offers many options useful for diagnosis and verification of a problem being solved.

The two formal approaches described above are suited for different kinds of dialogues. Depending on the objectives and the mathematical skills the participants bring in, one can choose between Bayesian networks and MDCAs. A combination of such tools can be a way to move forward.

2.6 Other contributing theories[6]

In the following, selected theoretical traditions such as collaborative planning theories, democratic theories and network theory are summarised. A short review into the history of these three approaches is useful in order to understand the origins of participation and public involvement. Furthermore, selected aspects of these theories will feed into our new Integrative Theory of Reflexive Dialogues (power relations and rules of discourse such as fairness). In the field of planning, different approaches and theories have been competing and moving between the poles of rationality and focus on social processes.

In the heydays of 'rational comprehensive planning' in the 60s' and 70s´ the prescription for planning and policy formation consisted of five stages: identify objectives with weights, identify alternative courses of action, predict consequences, evaluate the consequences on a common scale of value, and finally select the alternative whose net benefit is the highest (Rosenhead 2001). This approach was heavily criticised as being socially undesirable and practically infeasible (Lindblom 1959). The rational comprehensive planning approach neglected the multitude of conflicting

---

[6] Some of these and other important theories that relate to stakeholder dialogues in natural resources management are discussed (in more detail) in Chapters 3 - 6 (Berghöfer and Berghöfer 2006, Oels 2006, Scheffran 2006, Maarleveld et al. 2006) of this book.

interests and the fact that not all interests are equally represented in the decision-making.

Collaborative planning theories, which encompass critical theory, advocate planning and alternative planning put emphasis on the communicative aspects, power structures and disaggregation of effects (Leskinen 1994). Instead of searching for the optimal solution based on an assessment of net benefits (usually in monetary terms), the alternatives should be made visible by disaggregating the effects on different groups, the environment, the economy, etc. Collaborative planning theory adopted the theory of communicative action of Jürgen Habermas and saw the role of a planner as an active designer of the communicative process in which weak groups are intentionally given the opportunity to voice themselves (Forester 1985, 1993). Present practice of stakeholder dialogues and public participation in many policy fields (e.g. development aid) suggests that a transition has taken place towards more collaborative approaches.

Theories of democracy are also relevant for stakeholder dialogues and public participation. They help to clarify the relationships between representative decision-making and participatory procedures (O`Riordan and Stoll-Kleemann 2002). A difference can also be made, for example, between elitist and populist approaches to stakeholder dialogues. Democratic theories emphasise the importance of power, which different actors such as governments, multinational corporations, NGOs, and others use, which is an important element of our integrative theory. Representative decision-making and stakeholder/public participation do not compete but rather complement each other (Gunderson 1995, Kasemir et al. 2003, Stoll-Kleemann et al. 2001, 2003). In this context, focus groups are a useful communication tool to support democratic decision-making. Focus groups are widely used in public opinion research, marketing (Krüger 1993, Morgan 1988), and studies of mass communication (Merton 1987). In recent years they have also been applied in environmental science, such as in the ULYSSES and CLEAR projects (Jaeger et al. 2000, Kasemir et al. 2000, Stoll-Kleemann et al. 2001, 2003). There are few examples where focus groups have been applied directly to support parliamentary decision-making (Welp et al. in press).

New technologies, such as the Internet also open up new possibilities of citizen involvement and dialogues. The relation of the Internet and democratic decision-making has been discussed, for example, by Beierle (2002). The potential web-based knowledge systems offer for increasing the competence of lay citizen by giving them access to scientific knowledge has been discussed in Kasemir et al. (2003).

The final contributing approach to be considered in the analysis and practice of stakeholder dialogues are theories of networks (including social

capital formation). The importance of network theories can briefly be described as follows: Networks are thought to emerge whenever individual actors lack the necessary resources to achieve an output on their own and are required to collaborate with others to mobilise and pool resources (Messner 1998). Networks are understood as co-ordination mechanisms beyond markets and policy hierarchies, i.e. as qualitatively different from these other two mechanisms of co-ordination.

The workings of networks require the building of trust between the actors and are based on the principle of reciprocity. Reciprocity is the outcome of a productive tension between self-interests and solidarity in durable social relations (ibid). Productive networks depend on the actors' capacity for compromise and their respect for the legitimate interests of others. Networks are better equipped to deal with the complexity of 'modern' problems and risks. The communication between the various members of a network increases the system's capacity to take notice of, explore, and describe new problems. Where the resources for addressing the new problem are dispersed amongst diverse actors, an effective network between them is key to making these resources available for a collectively desired outcome (ibid). According to network theories, a crucial factor in the capacity of societies to address pressing problems and achieve collectively desired outcomes by drawing on network structures is the moral resources (ibid) or 'social capital' (Putnam 1993) available for collective action.

We do not claim that the list of theories identified is exhaustive. Some of the more interesting theories, which can only be named here, include post-normal science (see Chapter 7) and theories of power. Some of these, and other important theories that relate to stakeholder dialogues in natural resources management, are discussed in more detail in Chapter 3 of Berghöfer and Berghöfer (2006), Chapter 4 of Oels (2006), Chapter 5 of Scheffran (2006), and Chapter 6 of Maarleveld et al. (2006) of this book. All these Chapters (3 - 6) as well as Chapter 1 mention the "Tragedy of the Commons" (Hardin 1968) as an important starting point for stakeholder dialogues in natural resources management.

2.7 The Integrative Theory of Reflexive Dialogues

As in any research, the choice of theory can make a crucial difference in the kinds of outcomes one can expect to obtain. The practice of stakeholder dialogues is implicitly or explicitly influenced by conceptual frameworks and their underlying theories. In some cases, dialogues have

been carried out without reference to a particular theory, but in our view, a good theory is useful and increases the quality of the process and the quality of the output. On the other hand, practice influences theory: much of the theoretical thought is based on our practical work on science-based stakeholder dialogues and public participation in natural resources management. We have been faced with questions related to scientific rigour, relevance of the created knowledge, formal representation of stakeholder assessments, and the direct benefit of the stakeholder exercises for different actors. Our motivation to work in this field is that the present conceptual frameworks do not deal with many factors that are crucial for effective dialogues. We furthermore want to contribute to the further scientific understanding of stakeholder dialogues through theory selection, assessment, and development.

In this section, elements from the above-described scientific traditions (especially social psychological theories, organisational learning and formal approaches) are integrated into a theory of 'Reflexive Dialogues'. We realise that this is an ambitious effort and take note that a profound integration of scientific disciplines is challenging. We argue, however, that developing a "practical" theory of stakeholder dialogues instead of the "grand theory" is sensible and urgently needed in order to link different social scientific and formal ways of representing stakeholders assessment and to foster the development of analytical and communication tools in future research and practice.

The word "reflexive" implies that the rules of the dialogue are not fixed by the initiator or one of the participants, but that these rules are negotiable. This is a key feature and cornerstone of dialogues in the sense of the term used by Bohm. A non-reflexive dialogue would be one in which the initiator or facilitator poses the rules (how is the dialogue carried out) on other participants. In stakeholder dialogues, building mutual trust, knowing each other, and developing a common language requires commitment (time, resources) from all participants (Renn 2006). Commitment is not likely to emerge if the participants do not feel themselves part of the process of creating a dialogue.

We will elaborate the Integrative Theory of Reflexive Dialogues by discussing five key concepts: actors, structures, methods, processes, and outcomes. In terms of actors, our theoretical framework addresses various target groups and acknowledges the different roles individuals may play. So far, theories have variously had a strong focus on individuals, groups, organisations, or the society at large. The Integrative Theory of Reflexive Dialogues however recognises that actors are simultaneously members of very different social groups, different organisations, and part of the society. Some of the main actors that can be identified are scientists,

international institutions, governmental bureaucracies, the media, industry, and non-governmental organisations. The role of the stakeholders varies depending on the type of dialogue and the attention cycle of an issue. A stakeholder may act inside or outside of a process.

Furthermore, not only the varying roles of the actors in society but also their different individual preferences, values, and knowledge bases have to be taken into account. Actors can be seen as following the principles of rational decision-making. Rational choice theory provides approaches and tools to study preferences and represents these in formal ways (utility functions). According to an alternative view, decisions are not made by rational considerations of objectives, options, and consequences (Sterman 1991). This is the case because several biases influence human decision-making due to the limited cognitive ability of humans to take more than a few factors into account in making decisions (Kahneman et al. 1982). As a result, many decisions turn out to be incorrect. Therefore, people use mental models, which can be framed both positively and negatively, "as the filters through which we interpret our experiences, evaluate plans, and choose among possible courses of action" (Sterman 1991).

In stakeholder dialogues, people may act as individuals interacting with other individuals or as representatives of a group. In the latter case, they have a mandate to speak according to the group's interests. In the former case, individuals tend to be far more cooperative.

Among involved actors, power relations are usually unequally distributed. Power relations are one of the most important aspects influencing the structures of stakeholder dialogues and thus have to be considered in a theory of reflexive dialogues. In the practice of stakeholder dialogues, the ideal of a powerfree discourse postulated by Habermas will never be met, but it is indispensable in order to be more aware of asymmetric power relations. These asymmetries can be addressed and corrected by applying particular communication tools or other methods. Rules and principles are related to the fairness of the processes and need to be defined and specified by the people involved in the dialogues.
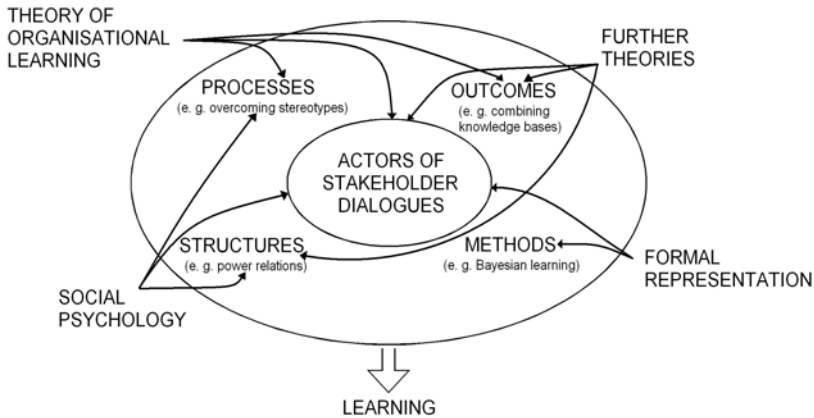
Fig. 2.2. Elements of the Integrative Theory of Reflexive Dialogues

Structures also encompass some of the general conditions in which dialogues take place. An important structural aspect is the (physical) cognitive limits of the human brain. Our ability to deal with complexity as required in stakeholder dialogues is limited and leads to processes such as stereotyping (see below) which in turn negatively affects communication (categorising groups of people into in-groups or out-groups) and learning in stakeholder dialogues. Public understanding of science is also a key component of such structures and has great importance in science-based dialogues but also in policy and management dialogues.

One objective of stakeholder dialogues is to combine different knowledge bases. The amount of attention different ways of knowing (scientific knowledge, expert knowledge and lay knowledge) get depends on the public's understanding of science and the policy process. Each way of knowing has its legitimisation. Lay knowledge is usually defined as being based on casual observations, but it may well be based on long-term experience, for example in natural resources use. In many management situations, scientific data is not available, necessitating knowledge of that kind (such as knowledge of fisheries and forestry). Indigenous people in particular often have detailed knowledge of places and local ecology and therefore can deliver important data relevant for natural resources management.

Processes in our conceptual framework refer to meta-communication, learning, and different modes of communication and stereotyping. Meta-communication is reflection about the process of communication. As mentioned above, a key feature of reflexive dialogue is the reflection on how the process should take place. It is necessary to agree on the rules of the process.

Finally, there is a key difference between consensus-seeking processes (such as policy dialogues, corporate dialogues) and processes that tolerate radically different views (science-based stakeholder dialogues). The exchange of arguments leads the participants to identify areas of agreement and disagreement and thus find new and relevant research questions.

Learning on the individual level, on the group level, and on the organisational level is a key concept in our Integrative Theory of Reflexive Dialogues. A system's capacity to learn is the foundation for self-organisation. Societies have been evolving constantly and have had kingship systems, village systems, empire systems, and national state systems. Monitoring and review practices at all levels are supposed to enable constant improvements in the self-organisation of the individual, the team, and the organisation/ society at large (Weber 1998).

The ability to innovate and create a global learning society may be one of today's greatest challenges. Public participation and stakeholder dialogues, if adopted on a broad basis, can become one way of fostering a global learning society. Social learning is a concept that deals with the question of how societies at large can cope with the changing world and new challenges. Social learning can be described as a cycle of discovering problems or issues, issue framing, drawing public attention to a new issue, debating possible solutions, and creating instruments, policies and management structures to cope with problems. In creating attention and framing issues, public media play a crucial role. The comparative history of three global change challenges - climate change, ozone depletion, and acid rain - as studied and described by the 'social learning group' at MIT provides an interesting overview of the social responses to these challenges (Clark et al. 2001a, b). For this study, the group considered as learning "those processes that deliberatively utilised experience or information to bring about cognitive changes" (Clark et al. 2001a: 14).

Stereotyping has been outlined above as an important process that determines communication and learning in stakeholder dialogues. A social stereotype is "a set of beliefs about the personal attributes of a group of people" (Ashmore and Del Boca 1981). Such sets of belief are "activated" (that is start influencing perception in a given situation) through identifying the group membership of a person (Enayati 2002). The stereotypical characteristics are attributed to all members of the out-group, and the individual's unique personal characteristics are ignored (Pennington et al. 1999).

The methods used in stakeholder dialogues need to be chosen so that they match the objectives of the dialogue. To achieve this, various kinds of tools are needed; we make a distinction between communication tools and

analytical tools. Communication tools are needed to inspire and structure interaction between individuals. For example, focus groups or role games provide a setting for people to interact. It is important to create a safe space in which participants feel comfortable to express their views. Each tool applies a certain set of rules that all participants should co-define and follow.

The tool "focus group" combines two social scientific research methods, i.e. the focused interview, in which an interviewer elicits information on a topic, and a group discussion, in which a small number of people from a relatively heterogeneous group discuss a topic raised by a skilled moderator (Dürrenberger 1997). Conventional focus groups are based on a group of people being exposed to some common stimulus, such as a computer model or an expert presentation (Merton 1987). The group then is invited to engage in a free-wheeling conversation about that topic. The point of the exercise lies in the ability to observe social processes of opinion formation in which some new information is taken into account (Jaeger et al. 2000).

Dialogues can greatly benefit from the use of analytical tools as well. Bayesian networks, multi-criteria decision analysis, and computer models can be used for testing arguments, inspiring new ones, and visualising issues and options. Bayesian networks are one way of formalising stakeholders` assessments. They combine a visual presentation of stakeholders` beliefs (mental models) and deal explicitly with uncertainty of information. The Bayesian approach also provides a method to analyse how stakeholders learn, i.e. how they update their beliefs, when confronted with new information and insights. In multi-criteria decision analysis (MCDA), objectives as well as measurable criteria are identified to assess the extent to which these objectives are met. Different options are weighted according to these criteria. MCAs are better suited to cope with the fact that not all impacts can be measured using the same unit. Disaggregation thus helps to make explicit what different alternatives mean for different groups.

The right analytical tools for a specific problem or issue do not always exist or are not always readily available. In such cases, joint model building exercises can be one way forward. The process itself helps clarify the important parameters, the views held by the participating individuals, and the points where consensus exists or disagreements prevail. So far, computer models have been rather inflexible, but new modelling approaches make it possible to link modules programmed in different languages. This contributes to greater flexibility and increases the ability to react to emerging research questions more quickly (Jaeger 2003).

The outcomes of stakeholder dialogues can be framed in different ways. Networking and getting to know interesting people are a type of outcome that usually emerges and that most participants greatly value. Network theories such as those described above explain the superiority of networks in group problem-solving compared to the abilities of individuals. As a result, networks emerge whenever individual actors lack the resources necessary to achieve an output on their own and need to collaborate with others to combine knowledge bases. Thus one important outcome of network formation in stakeholder dialogues is the ability to deal better with complex problems.

Stakeholder dialogues may contribute to attitude and behaviour change (people confronted with new information and experiences) such as more environmentally friendly behaviour[7] or a better acceptance of other groups (e.g. NGOs vs. Corporations or Nature Conservation Agencies vs. Farmers). These attitude and behaviour changes can also change the role of a person in the organisation he or she represents and can become a change agent. While changes in attitude can be assessed by interviewing, changes in behaviour are more difficult to track.

Constructive conflict management is sometimes necessary and requires special skills from the facilitator or moderator of dialogue. This is rarely the case in the area of natural resources management because actors in responsible positions are trained in natural science disciplines (Stoll-Kleemann 2005). Sometimes a consensus view can be the outcome, but especially in scientific dialogues, dissent can be a valuable outcome as well. Conflict management is needed in both cases. Even if consensus is not the ultimate objective of the process, the dialogues have to be managed so that the differences in views can be discussed in a constructive way.

2.8 Conclusions

Our decisions affect the world in a way that has global and lasting results. It is often difficult to determine the consequences of our actions because of

---

[7] As outlined in Chapter 1, due to a lack of scientific studies, there is no convincing evidence that stakeholder dialogues really lead to more environmentally friendly behaviour. The GoBi (Governance of Biodiversity) Research Group investigates this question in the context of biodiversity management. The project is still ongoing, but first results are summarized in Stoll-Kleemann (2005), Stoll-Kleemann and Bertzky (2006), Stoll-Kleemann et al. (2006).

the increasing interconnectedness of people, organisations, corporations, and states (Keen et al. 2005).

To address these challenges, we have developed an Integrative Theory of Reflexive Dialogue. The innovation of this theory lies in its consideration of social psychological factors - often neglected in this scientific area - and links them to similarly useful concepts of organisational learning and formal approaches. Social psychological approaches aid in fostering a better understanding of what determines the functioning of stakeholder dialogues insofar as they explain how attitudes, outlook, and behaviour are shaped in these processes.

We feel it is important to bring the Theory of Organisational Learning, primarily as outlined by Senge (1998), into the Integrative Theory of Reflexive Dialogues as it points to the conditions necessary for productive stakeholder dialogue. The theory demonstrates how representatives from many different organisational backgrounds and professional cultures can work together effectively for the duration of their joint efforts, and how they can team up in small groups, which provide opportunities for learning and joint problem-solving.

The third part of our theoretical framework, the formal approaches, offer a way to structure complex issues and competing interests. The controversial discussion about the Rational Actor Paradigm plays a key role in the way we see actors in natural resource management. They have varying degrees of risk aversion, have to make decisions under uncertainty, and thus do not have complete knowledge upon which to base their decisions. The Bayesian approach is relevant for framing problems, visualising stakeholders' mental models, and observing how stakeholders learn. Although mathematical and formal applications are useful in participation and dialogues, they need to be embedded in a full cycle of trust building and reflection, i.e. the proper stages of successful dialogues.

The concept of learning is the interface between the theories explained and is thus the cornerstone of the Integrative Theory of Reflexive Dialogue. Stakeholder dialogues benefit from the application of learning as one key concept. It draws attention to learning in groups and organisations but also puts stakeholder dialogues into the broader context of social learning. Stakeholder dialogues have great potential in the assembly, transformation, multiplication, and spread of the knowledge requisite to achieve implementable, successful solutions.

References

Ames, D.P., Neilson, B.T. (2001). A Bayesian Decision Network Engine for Internet-Based Stakeholder Decision-Making. World Water and Environmental Resources Congress. Orlando, Florida

Argyris, C., Schön, D.A. (1996). Organisational Learning II: Theory, method, and practice, Reading. Addison-Wesley

Asch, S. (1956). Status of Independence and Conformity: A Minority of One Against a Unanimous majority. Psychological Monographs 70 (9)

Ashmore, R.D., Del Boca, F.K. (1981). Conceptual approaches to stereotypes and stereotyping. In: Hamilton, D.L. (ed). Cognitive processes in stereotyping and intergroup behavior. Lawrence Erlbaum, Hillsdale, 1-35

Beierle, T.C. (2002). Democracy On-line: An Evaluation of the National Dialogue on Public Involvement in EPA Decisions. RFF Report, Resources for the Future, Washington D.C

Berghöfer, A., Berghöfer, U. (2006). ‚Participation' in Development Thinking – Coming to Grips with a Truism and its Critiques. In: Stoll-Kleemann, S., Welp, M. (eds). Stakeholder Dialogues in Natural Resources Management. Springer-Verlag, Heidelberg

Bohm, D. (1996). On Dialogue. Routledge

Bostrom, A., Fischhoff, B., Morgan, M.G. (1992). Characterizing mental models of hazardous process: A methodology and an application to radon. J. Social Issues 48, 85-100

Breen, R. (1999). Beliefs, rational choice and Bayesian learning. Rationality and Society 11, 463-479

Brehm, J.W. (1966). A Theory of Psychological Reactance. Academic Press, New York

Cain, J. (2001). Planning improvements in natural resources management. Guidelines for using Bayesian networks to support the planning and management of development programmes in the water sectors and beyond. Centre for Ecology and Hydrology CEH, Wallingford, UK

Clark, W.C., Jäger, J., van Eijndhoven, J., Dickson, N.N. (2001a). Learning to Manage Global Environmental Risks: A Comparative History of Social Responses to Climate Change, Ozone Depletion and Acid Rain. The MIT Press, Cambridge, Massachusetts

Clark, W.C., Jäger, J., van Eijndhoven, J., Dickson N.N. (2001b). Learning to Manage Global Environmental Risks: A Functional Analysis of Social Responses to Climate Change, Ozone Depletion, and Acid Rain. The MIT Press, Cambridge, Massachusetts

Dawes, R.M., Messick, D.M. (2000). Social Dilemmas. International Journal of Psychology 35 (2), 111-116

Dogson, J., Spackman, M., Pearman, A., Phillips, L. (1999). DTLR Multi-Criteria Analysis Manual, NERA (National Economic Research Associates)

Doise, W. (1978). Groups and individuals: Explanations in social psychology. Cambridge University Press, Cambridge

Dürrenberger, G., Behringer, J., Dahinden, U., Gerger, Å., Kasemir, B., Querol, C., Schüle, R., Tabara, D., Toth, F., van Asselt, M., Vassilarou, D., Willi, N., Jaeger, C.C. (1997). Focus Groups in Integrated Assessment. A Manual for a participatory tool. ULYSSES WP-97-2. Darmstadt University of Technology, Center for Interdisciplinary Studies in Technology, Darmstadt

Enayati, J. (2002). The research: Effective Communication and Decision-Making in Diverse Groups Beyond Deadlock and Conflict. In: Hemmati, M. (ed). Multi-stakeholder Processes for Governance and Sustainability. Earthscan, London, 73-95

Ernst, A.M., Bayen, U.J., Spada, H. (1992). Informationssuche und -verarbeitung zur Entscheidungsfindung bei einem ökologischen Problem. In: Pawlik, K., Stapf, K.H. (eds). Huber, Bern, 107-127

Forester, J. (1985). Critical Theory and Planning Practice. In: Forester, J. (ed). Critical Theory and Public Life. The MIT Press, Massachusetts, 202-227

Forester, J. (1993). Critical Theory, Public Policy and Planning Practice. Toward a Critical Pragmatism. State University of New York Press, Albany

Gardner, G.T., Stern, P.C. (1996). Environmental Problems and Human Behavior. Allyn and Bacon, Boston

Gunderson, A. (1995). The Environmental Promise of Democratic Deliberation. University of Wisconsin Press, Madison

Hardin, G. (1968). The tragedy of the commons, Science 168, 1243-1248

Hemmati, M. (2002). Multi-stakeholder Processes for Governance and Sustainability. Earthscan, London

Hogg, M.A., Vaughan, G. (1998). Social Psychology. Prentice Hall Europe, Harlow

IIASA (2004). International Institute for Applied Systems Analysis (IIASA). Austria, Vienna. Available from World Wide Web. URL: http://www.iiasa.ac.at/~marek/soft

Jackson, S.E. (1996). The Consequences of Diversity in Multidisciplinary Work Teams. In: West, M. (ed). Handbook of Work Group Psychology. John Wiley & Sons, Chichester, New York

Jaeger, C.C. (2003). A Note on Domains of Discourse – Logical Know-How for Integrated Modelling. Potsdam Institute for Climate Impact Research (PIK). Working paper No. 86

Jaeger, C.C., Renn, O., Rosa, A., Webler, T. (1998). Decision analysis and rational action. In: Rayner, S., Malone, E.L. (eds). Human Choice and Climate Change. Battelle Press, Columbus, Ohio

Jaeger, C.C., Kasemir, B., Stoll-Kleemann, S., Schibli, D., Dahinden, U. (2000). Climate change and the voice of the public. Integrated Assessment 1, 339-349

Jentsch, A., Wittmer, H., Jax, K., Ring, I., Henle, K. (2003). Biodiversity - Emerging Issues for Linking Natural and Social Sciences. GAIA 12 (2), 121-128

Kahneman, D., Slovic, P., Tversky, A. (1982). Judgement under uncertainty: heuristics and biases. Cambridge University Press, Cambridge

Kasemir, B., Dahinden, U., Swartling, Å.G., Schüle, R., Tabara, D., Jaeger, C.C. (2000). Citizens' perspectives on climate change and energy use. Global Environmental Change 10 (3), 169-184

Kasemir, B., Jaeger, C.C., Jäger, J. (2003). Public participation in sustainability assessments. In: Kasemir, B., Jäger, J., Jaeger, C. C., Gardner., M. T. (eds). Public Participation in Sustainability Science. Cambridge University Press, Cambridge

Keen, M., Brown, V.A., Dyball, R. (2005). Social Learning: A New Approach to Environmental Management. In: Social Learning in Environmental Management: building a sustainable future. Earthscan, London

Kolb, D. (1984). Experiential learning: Experiences as the source of learning and development. Prentice-Hall, Englewood Cliffs

Krüger, R.A. (1993). Quality Control in Focus Group Research. In: Morgan, D.L. (ed). Successful Focus Groups: Advancing the state of the art. Sage Publications, Newbury Park, 65-85

Lantermann, E.D., Döring-Seipel, E. (1990). Umwelt und Werte. In: Kruse, L., Graumann, C.F., Lantermann, E.D. (eds). Ökologische Psychologie. Ein Handbuch in Schlüsselbegriffen. Psychologie Verlags-Union, München , 632-639

Lantermann, E.D., Döring-Seipel, E., Schima, P. (1992). Werte, Gefühle und Unbestimmtheit: Kognitiv-emotionale Wechselwirkungen im Umgang mit einem ökologischen System. In: Pawlik, K., Stapf, K.H. (eds). Umwelt und Verhalten: Perspektiven und Ergebnisse ökopsychologischer Forschung. Huber, Bern, 129-144

Leskinen, A. (1994). Environmental Planning as Learning: The Principles of Negotiation, the Disaggregative Decision-making Method and Parallel Organisation in Developing the Road Administration. Publications No. 5. University of Helsinki. Department of Economics and Management, Land Use Economics, Helsinki

Lindblom, C.E. (1959). The science of muddling through. Public Administration Review 19 (2), 79-88

Maarleveld, M., van de Velde, R., van Uum, J., Pleisier, I. (2006). To See or not to See, that is the Question: Geo-information Visualization Tools as a Means to Facilitate Stakeholder Dialogues in Land and Water Management Planning. In: Stoll-Kleemann, S., Welp, M. (eds). Stakeholder Dialogues in Natural Resources Management. Springer-Verlag, Heidelberg

Mackie, D.M., Hamilton, D.L. (1993). Affect, cognition and stereotyping: interactive processes in group perception. Academic Press, San Diego

Merton, R.K. (1987). The focussed interview and focus groups: continuities and discontinuities. Public Opinion Quarterly 51 (4), 550-566

Messner, D. (1998). Die Netzwerkgesellschaft: Wirtschaftliche Entwicklung und internationale Wettbewerbsfähigkeit als Probleme gesellschaftlicher Steuerung. Weltforum Verlag, Köln

Morgan, D.L. (1988). Focus Groups as Qualitative Research. Sage, Newbury Park

O'Connor, M. (2000). The VALSE project - an introduction. Ecological Economics 34 (Special Issue: Social Processes of Environmental Valuation), 165-174

Oels, A. (2003). Evaluating stakeholder participation in the transition to sustainable development: Methodology, case studies and implications for policymaking. LIT-Verlag, Münster

Oels, A. (2006). Evaluating Stakeholder Dialogues. In: Stoll-Kleemann, S., Welp, M. (eds). Stakeholder Dialogues in Natural Resources Management. Springer-Verlag, Heidelberg

O`Riordan, T., Stoll-Kleemann, S. (2002). Deliberative democracy and participatory biodiversity. In: O`Riordan, T., Stoll-Kleemann, S. (eds). Biodiversity, Sustainability and Human Communities. Protecting Beyond the Protected. Cambridge University Press, Cambridge, 87-112

Pavitt, C. (1993). What (little) we know about formal group discussion procedures. A review of relevant research. Small Group Research 24 (2), 217-235

Pennington, D.C., Gillen, K., Hill, P. (1999). Social psychology. Arnold, London

Pettigrew, T. (1989). Intergroup Contact Theory. Annual Reviews of Psychology 49, 65-85

Phillips, G.M., Wood, J.T. (1984). Emergent Issues in Human Decision-making. Southern Illinois University Press, Carbondale

Pratt, J. Gordon, P., Plamping, D. (1999). Working whole systems. Putting theory into practice in organisations. King's Fund, London

Putnam, R. D. (1993). Making Democracy work. Civic Traditions in Modern Italy. Princeton University Press, Princeton

Putnam, R. D. (2002). The Collapse of the Fact/Value Dichotomy and other Essays. Harvard University Press, Cambridge, MA

Renn, O. (2006). Participatory Processes for Natural Resource Management. In: Stoll-Kleemann, S., Welp, M. (eds). Stakeholder Dialogues in Natural Resources Management. Springer-Verlag, Heidelberg

Rosenhead, J. (2001). Introduction: old and new paradigms of analysis. In: Rosenhead, J., Mingers, J. (eds). Rational Analysis for a Problematic World Revisited: Problem Structuring Methods for Complexity, Uncertainty and Conflict. John Wiley and Sons Ltd, Chichester

Scheffran, J. (2006). Tools for Stakeholder Assessment and Interaction. In: Stoll-Kleemann, S., Welp, M. (eds). Stakeholder Dialogues in Natural Resources Management. Springer-Verlag, Heidelberg

Scheffran, J., Stoll-Kleemann, S. (2003). Participatory Governance in Environmental Conflict Resolution: Developing a Framework of Sustainable Action and Interaction. In: Deb, K., Srivastava, L. (eds.). Transitions Towards Sustainable Development in South Asia. The Energy and Resources Institute. India, New Delhi, 307-327

Seibold, D.R. (1999). The Impact of Formal Procedures on Group Processes, Members, and Task Outcomes. In: Frey, L.R. (ed). The Handbook of Group Communication Theory and Research. Sage, Thousand Oaks, CA, 395-431

Senge, P. (1998). The fifth discipline. The art and practice of the learning organisations. Century Business, London

Sherif, M. (1966). Group conflict and cooperation: their social psychology. Routledge and Kegan Paul, London

Sherif, M., Sherif, C.W. (1953). Groups in Harmony and Tension. Harper, New York

Simon, H.A. (1957). Models of Man. Social and Rational. John Wiley & Sons, New York

Smith, E.R., Mackie, D.M. (2000). Social Psychology. Psychology Press, Sussex, Philadelphia

Sterman, J.D. (1991). A Skeptic's Guide to Computer Models. Available from World Wide Web: <http://web.mit.edu/jsterman/www/Skeptic's_Guide.pdf>

Sterman, J.D. (2002). All models are wrong: reflections on becoming a systems scientist. System Dynamics Review 18 (4), 501-531

Stoll-Kleemann, S. (2001a). Reconciling Opposition to Protected Areas Management in Europe: The German experience. Environment 43 (5), 32-44

Stoll-Kleemann, S. (2001b). Barriers to Nature Conservation in Germany: A model explaining opposition to protected areas. Journal of Environmental Psychology, 21 (4), 369-385

Stoll-Kleemann, S. (2003). Integrating social psychological theories for interdisciplinary global change research. GAIA 12 (4), 325-326

Stoll-Kleemann, S. (2005). Voices for Biodiversity Management in the 21st Century. Environment 47 (10), 24-36

Stoll-Kleemann, S., O`Riordan, T. (2002a). From participation to partnership in biodiversity protection: experience from Germany and South Africa. Society and Natural Resources 15 (2), 157-173

Stoll-Kleemann, S., O`Riordan, T. (2002b). Enhancing Biodiversity and Humanity. In: O`Riordan, T., Stoll-Kleemann, S. (eds). Biodiversity, Sustainability and Human Communities. Protecting Beyond the Protected. Cambridge University Press, Cambridge, 295-310

Stoll-Kleemann, S., Bertzky, M. (2006). Biodiversity Management and Monitoring in Protected Areas – State of the Art and Current Trends. In: Sonak, S. (ed). Multiple Dimensions of Global Environmental Change. Teri Press, New Delhi, India, 143-169

Stoll-Kleemann, S., O'Riordan, T., Jaeger, C.C. (2001). The psychology of denial concerning climate mitigation measures: evidence from Swiss focus groups. Global Environmental Change 11 (2), 107-117

Stoll-Kleemann, S., O`Riordan, T., Burns, T. (2003). Linking the citizen to governance for sustainable climate futures. In: Kasemir, B., Gardner, M., Jäger, J., Jaeger, C.C. (eds). Public Participation in Sustainability Science. Cambridge University Press, Cambridge, 239-248

Stoll-Kleemann, S., Bender, S., Berghöfer, A., Bertzky, M., Fritz-Vietta, N., Schliep, R., Thierfelder, B. (2006). Linking Governance and Management Perspectives with Conservation Success. Perspectives on Biodiversity Governance and Management 1 (1), 1-40

Tajfel, H. (1978). Differentiation between Social Groups. Academic Press, London

Tajfel, H., Turner, J.C. (1979). The social identity theory of intergroup conflict. In: Worchel, S., Austin, W.G. (eds). The Social Psychology of Intergroup relations. Brooks/Cole, Monterey, CA, 188-204

Triandis, H.C., Hall, E.R., Ewen, R.B. (1965). Member Heterogeneity and Dyadic Creativity. Human Relations 18 (1), 33-55

Turner, J.C. (1982). Towards a cognitive redefinition of the social group. In: Tajfel, H. (ed). Social identity and intergroup relations. Cambridge University Press, Cambridge, 15-40

Tyler, T.R., Degoey, P. (1995). Collective Restraint in Social Dilemmas: Procedural Justice and Social Identification Effects on Support for Authorities. Journal of Personality and Social Psychology 69, 482-497

University of Dortmund (2006). Available from World Wide Web: URL: http://kiew.cs.uni-dortmund.de:8001/mlnet/instances/81d91eaae441d87555, [07.08.2006]

Von Neumann, J., Morgenstern, O. (1944). Theory of Games and Economic Behavior. Princeton University Press, Princeton

Weber, S. (1998). Organisationsentwicklung und Frauenförderung: Eine exemplarische Untersuchung in 3 Organisationstypen der privaten Wirtschaft. Ulrike Helmer Verlag, Königstein/Taunus

Welp, M., de la Vega-Leinert, A.C., Stoll-Kleemann, S., Jaeger, C.C. (2006a). Science-based stakeholder dialogues: Theories and tools. Global Environmental Change 16 (2), 170-181

Welp, M., de la Vega-Leinert, A.C., Stoll-Kleemann, S., Fürstenau, C. (2006b). Science-based stakeholder dialogues in climate change research. In: Stoll-Kleemann, S., Welp, M. (eds). Stakeholder Dialogues in Natural Resources Management. Springer-Verlag, Heidelberg

Welp, M., Kasemir, B., Jaeger, C. C. (in press). Citizens' Voices in Environmental Policy: The Contribution of Integrated Assessment Focus Groups to Accountable Decision Making. In: Coenen, F.H.J.M., Paterson, R. (eds). The Promise and Limits of Participatory Processes for the Quality of Environmentally Related Decision-making, Springer-Verlag, Heidelberg

Wheatley, M.J. (1992). Leadership and the new science: Learning about organisation from an orderly universe. Berret-Koehler Publishers, San Francisco

Wynne, B. (2005). Risk as globalising 'democratic' discourse? Framing subjects and citizens. In: Leach, M., Scoones, I., Wynne, B. (eds). Science and Citizens. Globalisation and the challenge of engagement. Zed Books, London