

Conflict Management as a Means to the Sustainable Use of Natural Resources

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Kyllönen, S., Colpaert, A., Heikkinen, H., Jokinen, M., Kumpula, J., Marttunen, M., Muje, K. & Raitio, K. 2006. Conflict management as a means to the sustainable use of natural resources. *Silva Fennica* 40(4): 687–728.

Democratic societies' emphasis on individual rights and freedoms inevitably opens them up to political disputes. Conflict management should thus be seen as an integral part of democratic institutional design. The evolution and management of policy disputes concerning the use of different natural resources in Finland is analysed by using the theoretical models of frame analysis and strategic interaction. The studied disputes include lake fisheries, watercourse regulation, reindeer herding, and forestry. The institutional design in the case studies varies. Despite the differences, many common features are identified that could explain their successes or difficulties in achieving sustainable and cooperative use of the resources. Among these are problems involving complex and uncertain knowledge, differences in frames held by multiple users of a resource, and distrust between the users and other parties. The analysis concludes with preliminary conclusions on how various disputes related to sustainable resource use could be managed. These include addressing the knowledge and frame problems in order to initiate a learning process; establishing sub-processes in which mutual trust between the parties – including a managing authority or a third party – can emerge; giving explicit roles and a clear division of entitlement to the parties; and providing a credible alternative for co-operation that affects the parties' payoff assessments during the process. Finally, the conflict management process shouldn't be regarded as a distinct phase of dispute resolution, but as an essential aspect of ongoing co-management practices of resource use.

Keywords conflict management, resource management, sustainability, deliberative participation, frame analysis, assurance game, prisoner's dilemma

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Received 6 July 2004 **Revised** 15 June 2006 **Accepted** 3 October 2006

Available at <http://www.metla.fi/silvafennica/full/sf40/sf404687.pdf>

1 Introduction

Democratic societies are based on individual basic rights and freedoms, such as freedom of conscience, freedom of speech and assembly, and personal freedoms, as well as the right to own property and the political rights to vote and to stand for public office. This emphasis on individuals' liberty to choose their own values and act accordingly inevitably opens up democratic societies to various kinds of political disputes. Disagreement rather than agreement therefore characterises the normal state of society.

During modern times it has also been increasingly accepted in Western democracies that individuals should have the right to participate in decision-making processes that concern important aspects of their lives. Indeed, several recent studies have indicated the importance of co-management or participatory decision-making practices – especially in the management of so-called common-pool or open-access resources (Webler et al. 1995, Morgan 1998, Beierle and Cayford 2002).

It seems evident that natural-resource management cannot be exclusively dealt with at the State (through official sanctions and incentives) or the local (through local necessities and cultural differences) level without support and acceptance from the other level (Hanna et al. 1996, Ostrom 1990, Saarela 2003). This makes it necessary for modern democratic decision-making institutions to increasingly include ordinary concerned citizens as equal partners in decision-making processes (Ruckelshaus 1998). This often proves to be very difficult in practice, however. The various ways in which natural resources are managed provide many illustrative examples of how different goals, including those related to the public interest, individual rights, equality, democratic decision-making practices and the sustainable utilisation of limited resources, are hard to combine in the same decision-making process.

The tendency of democratic societies to engage in internal policy disputes has given rise to numerous sociological, political and philosophical studies and theories. Basic questions of political philosophy have concerned co-ordination and the stability of social co-operation in a democratic society (e.g., Rawls 1972). According to theo-

ries of conflict regulation (e.g., Dahrendorf 1959, Deutsch 1973), conflicts *per se* should not be considered problems. Instead, social institutions should be developed so as to react to these conflicts constructively, and to make gradual social change possible. Conflict management could thus be seen as an integral part of the functioning of democratic societies.

During the last fifty years economists and decision theorists, in turn, have developed different theoretical models to characterise individual behaviour, social choice, and strategic interaction (e.g., Olsson 1965, Elster 1979, 1989). One of the main topics within these formal characterisations has been *social dilemmas*. Social dilemmas are situations in which individuals, each of them following their individually rational strategies, end up with collectively irrational outcomes.

Failing to manage common natural resources is one of the most paradigmatic examples that social dilemmas can produce. How this kind of failure can gradually come into existence was theoretically explained in Garrett Hardin's well-cited article 'The Tragedy of the Commons' (Hardin 1968). Hardin's tragedy is a formal characterisation of a social dilemma, and as such necessarily an oversimplification. Formal characterisations nevertheless help us to understand the evolution of problematic situations that have arisen even though none of the individual participants initially preferred them. It must also be accepted, however, that there is more than one game-theoretic model behind the formal characterisation of such dilemmas. Different models, known as *assurance games*, *the prisoner's dilemma* and *deadlock games*, are introduced in Section 3 of this article.

We are suggesting here that successful dispute resolution and conflict management needs to step away from purely game-theoretical analysis of policy disputes. Nevertheless, if we allow that these game-theoretical models characterise the use of natural resources, it could help us to clarify why a situation involving a social dilemma is so vulnerable to further escalation into a policy dispute, and in the worst cases into an open conflict. In an assurance game, individuals prefer a co-operative solution, whereas in the prisoner's-dilemma and deadlock games they prefer non-co-operative conflict strategies. These dif-

ferent models are used in this article as heuristic devices in the analysis of different stages of policy disputes characterising the use of natural resources.

The evolution of real conflicts is then analysed by combining the above-mentioned categories and game-theoretical models in case studies on the use of different natural resources in Finland. These case studies vary from lake fisheries to reindeer herding (see Section 2 and Table 1), and also introduce the various types of institutional frameworks within which different types of policy disputes occur. Examples are drawn from common-pool resources, rather than open-access natural resources, thus they are all to some extent regulated, owned and used by specific social and institutional groupings.

Despite the differences between the natural resources and the institutions that manage them, the cases share many common features that could explain their successes or their difficulties in terms of conflict management. This is not necessarily surprising: in their comparative study of over 200 cases from vastly different contexts in the U.S., Beierle and Cayford (2002) noted that the issue at hand was far less significant in determining the success of participatory planning or conflict management than the *negotiation process*.

It is therefore vital to compare and synthesise the management of different natural resources in Finland, and to share the lessons learned in one context with people involved in other spheres of activity. This analysis concludes with a discussion and some preliminary advice on how various conflicts related to the sustainable use of natural resources could be managed.

2 Source Projects and Case Studies: Data and Methods

This article is based on research undertaken within various projects funded by the Academy of Finland in the SUNARE research programme. The projects, institutions and their contributions to this article are listed in Table 1. The data and methods used in these projects are then described in as far as they relate to the case studies presented.

The “Sustainability in forest use” project con-

sortium outlined a multidisciplinary approach to forestry and forest policy by combining philosophical, sociological and forest-economics research (for the results of the whole consortium see Loukola and Tervo 2004). The theoretical framework presented in this article represented one of the main areas of philosophical research in the sub-project entitled “The transformation of individual goals into common goods in environmental contexts”. Thus, the main research tasks in this sub-project included a theoretical analysis of environmental dilemmas and conflicts, and the formulation of legitimate management measures (see, for instance, Kyllönen 2002, Kyllönen and Raitio 2004). Conflict management was also analysed as one main goal of participatory decision-making implicit in sustainable development (Kyllönen 2004, Primmer and Kyllönen 2006).

The LUIAS project (Section 4.2.1) was broadly divided into two main components. The first component comprised a study of socio-economic relationships between reindeer herding and other forms of land use, and the second a study of the direct effects of competing forms of land use on reindeer herding. The study incorporated both structured interviews with specific key actors and a survey sent to all reindeer owners in the area in question. A survey of and interviews with tourists visiting the area were also carried out.

The study on the direct effects of other forms of land use relied heavily on GPS-tracking data. A total of 29 female reindeer were tracked during the years 1999–2002, and 10,977 positions were recorded (Colpaert et al. 2003). Pasture use in terms of time and space was studied by combining the GPS data and forestry maps obtained from Metsähallitus using a Geographical Information System (GIS). Field observations on snow characteristics and pasture use formed an important part of the study. Remote sensing methods and Landsat satellite images were used to obtain information on land-use change and the impact of other forms of land use.

The University of Jyväskylä INSURE project focused on the sustainability of commercial fisheries in Finnish inland lakes from the perspective of biological, socio-economic and institutional sustainability. The first two aspects of sustainability were modelled in a case study that ran over 21 years in which observations of a fishery of three

Table 1. Source projects used in this article.

Authors, projects and institutions involved	Natural-resource issue studied	Main research interests and aims	Theoretical models and case studies reported in this article
Simo Kyllönen <i>Sustainability in forest use</i> University of Helsinki	Values affecting decision-making in forest management: a social-scientific and ethical analysis	Research into social dilemmas in environmental contexts, and into the role of deliberative/participatory modes of democracy in conflict management.	Theoretical models of social dilemmas, policy disputes, and conflict management
Alfred Colpaert Jouko Kumpula <i>LUIAS</i> University of Oulu	Multiple land use in reindeer-herding areas; the impact on pastures	Study of relations between competing forms of land use with respect to reindeer husbandry in northern Finland.	Conflict management in the context of reindeer herding and land use
Kari Muje <i>Insure</i> University of Jyväskylä	(Interlocked) management of separate fish stocks as a single resource	Socio-economic and biological conditions for the interlocked management of vendace fisheries.	Commercial Lake Fishery
Kaisa Raitio <i>LINK-FOREST</i> University of Joensuu	Decision-making and conflict management in State forestry planning	The content of the “black box” of decision-making: to examine the rationales behind various forest-management strategies, and to assess how they relate to stakeholder input and ecological goals.	Metsähallitus (formerly the Finnish Forest and Park Service)
Hannu Heikkinen Mikko Jokinen <i>The effects of reindeer husbandry and nature conservation on the Malla Strict Nature Reserve</i> Finnish Forest Research Institute (METLA)	The effects of reindeer herding and nature conservation on arctic upland ecosystems	Culturally shared meanings given to nature and arguments for nature conservation. Conflict management through communication and by making meanings explicit.	Malla Strict Nature Reserve
Mika Marttunen <i>The sustainable regulation of large watercourses (PRIMEREG)</i> Finnish Environment Institute (SYKE)	The multi-objective development of the regulation of a large watercourse	To study the applicability of the decision-analysis interview method in the analysis of the preferences of various stakeholders and to support the collaborative planning process.	Lake Päijänne

lakes were used to reconstruct an interlocked fishing district. This reconstructed fishing district allowed increased mobility of fishers within a wide resource base. Two surveys were conducted in order to study institutional and social sustainability more deeply. The aim of the first survey was to clarify the present use of lakes in commercial fishery, and to ascertain the fishers' opinions of the possibility and need to extend the area in their use. The second survey focused on the other prime interest group, the owners of fishing rights (shareholders associations) and on their attitudes towards commercial fishery and the possibility to create more extensive arrangements for its licensing.

For the purpose of this article the themes of knowledge and scales of management were singled out (Section 4.2.3). These are themes that are typically present in many fishery-related disputes and they were studied in more detail by means of focus-group interviews, the results of which are as yet unpublished. (For the published results and a more detailed description of the data and method, see Muje et al. 2004, Nykänen and Muje 2005.)

The LINK-FOREST project based at the University of Joensuu comprised several sub-projects focused on the legal, economic, ecological and social aspects of sustainable forest management. The empirical case presented in this paper is based on the sub-project on conflict management in State forestry in Finland (for the results of the other sub-projects see e.g., Laakso 2003, Matero et al. 2003, Matero 2004). The aim of this sub-project and the case study presented in this paper was to analyse how conflicts related to State forests are managed, how the solutions made by the State administrators are justified, and what role the institutional framework plays in the process and the justifications.

The empirical material of the study consisted of: a) 28 semi-structured interviews conducted in the institutions responsible for administering State forests in Finland, in other words the Finnish Forest and Park Service (*Metsähallitus*), the Ministry of the Environment and the Ministry for Agriculture and Forestry, b) written policy documents and forest-management plans produced by these organisations, and c) legal documents such as existing legislation on State forestry, and related preparatory documents. In addition, writ-

ten data was collected on the positions of other stakeholders (such as reindeer herders, environmental NGOs and industry) involved in related conflicts. The qualitative analysis of the data included content analysis, frame analysis and socio-legal analysis (Cotterrell 1992, Schön and Rein 1994, Laitinen 2002, Tuomi and Sarajärvi 2002). The analysis and conclusions presented in this article (Section 4.3.2) focus on the role of organisational structures and institutional frames in conflict management. They are based on the analysis of conflict-management efforts between State forestry and reindeer herding in Inari, Finnish Lapland. (For the published results and a more detailed description of the data and methods, see e.g., Raitio and Rytteri 2005, Kyllönen and Raitio 2004, Raitio 2003.)

The objectives of the Malla project "Effects of reindeer husbandry and nature conservation on the Malla Strict Nature Reserve", was to estimate the effects of the reindeer herding, or the lack of it, in the reserve on nature and local society, and to provide tools for conflict management. The project was multidisciplinary, and included both ecological and socio-cultural approaches (Jokinen 2005a). Here (Section 4.4.3) we focus on the socio-cultural aspects of the Malla conflict, and on the driving forces behind the whole process.

Our data comprised four types of cultural material. First, 30 semi-structured interviews were conducted among reindeer herders in the Käsivarsi region of Finnish Lapland during the years 1998–2002 by Mikko Jokinen and Hannu Heikkinen, as a part of their doctoral study (for detailed information see e.g., Heikkinen 2002). Secondly, Sini Pölkki, Lotta Jaakkola and Mikko Jokinen conducted 29 semi-structured interviews with experts in Finland, Sweden and Norway in 2000–2002 (for detailed information, see Heikkinen et al. 2005b). Experts in this context were people who were dealing with the question of conservation and the sustainable use of sub-arctic nature in a professional or personal capacity.

The third type of data set was gathered through the Internet-based Delphi panel. Forty-eight experts from Finland were invited to join the discussion, which was in the form of a questionnaire with open fields for comments that the other panellists were able to read. A total of 15 experts contributed to the panel (for further informa-

tion about the data and the Delphi method, see Heikkinen et al. 2005b, Kuusi et al. 1998, Kuusi 2002). Finally, participant observation (Bernard 1995) was used to further understanding of the cultural factors that lay behind the environmental conflict, specifically during the fieldwork with reindeer herders, in seminars and meetings connected with the Malla case, and during personal visits. The analysis was qualitative (Miles and Huberman 1994, Bernard 1995) and theoretically anchored in cognitive anthropology, which incorporates models of shared knowledge (cultural meanings) (Quinn and Holland 1987, D'Andrade 1995, Shore 1996, Strauss and Quinn 1997).

The purpose of the PRIMEREG project was to establish principles, methods and indicators for ecologically, socially and economically sustainable water-course regulation (Marttunen et al. 2004a, 2004b, Vääntänen and Marttunen 2005). In addition, new methods for public participation were developed and tested in three large water-course development projects: Lake Päijänne, the Pirkanmaa region and Kemijärvi (Marttunen and Jävinen 1999, Marttunen et al. 2004a, 2004b). In all of these, collaborative planning was used to improve the quality of the processes and their outcomes, and although the aims and major phases were the same, the practices and participatory methods differed to some extent. The new methods developed and tested during the projects included multi-criteria decision analysis, Web-based participation and decision-structuring dialogue (Mustajoki et al. 2004, Slotte and Hämäläinen 2003). In the case study reported in this article (Section 5.2), we assess the main reasons why a joint solution was found in the controversial Lake Päijänne project, and discuss the crucial role of multi-criteria decision analysis in this collaborative and consensus-seeking process.

The above comprise the source projects and case studies considered in this article, all of which were part of the SUNARE programme. They thus do not provide a comprehensive sample of Finnish conflicts in the use of natural resources but we nevertheless think they offer a good variety of resource-use situations that could form a basis for theoretical analysis and discussion.

3 Social Dilemmas in Managing Natural Resources

In Hardin's famous example of pastures and herders, the "tragedy of the commons" develops when commonly owned land is used to maximise the gain of individual herdsmen. In this situation each herdsman gains by increasing the size of his herd, since he will receive all the proceeds from the sale of any additional animals. The disadvantages of increasing the herd size are common to all the herdsmen, however. In other words, the positive utility of each additional animal to one herdsman is almost +1, while the negative utility to the individual herdsman of the additional animal's extra grazing of the common land shared by them all is only a fraction of -1. Given that each herdsman is a rational actor seeking to maximise his gain, they will all choose to add more and more animals to their herds. The inevitable outcome is overgrazing – the over-use of the depleting resources of the commons (Hardin 1968).

The situation illustrated by Hardin takes the form of a well-known philosophical problem – the prisoner's dilemma (see Luce and Raiffa 1957, Taylor 1987, Hardin 1992). Two actors imprisoned separately are faced with a choice between *defecting* (confessing to their joint crime in order to reduce their own individual punishment) or *co-operating* (with their partner in crime and refusing to confess). Both prisoners know that if neither confesses, they will receive a short sentence for a lesser offence and spend a year in prison, but if one confesses and turns state's evidence, he or she will be released, and the other one will receive a particularly heavy term of ten years: if both confess each gets five years.

Given that both prisoners are rational, self-interested, gain-maximisers, each has a sufficient motive to defect (confess) whatever the other does. The advantage of this strategy for each of them is clear. First, defecting will possibly produce the most profitable outcome (release) on the assumption that the other prisoner will act co-operatively (refuse to confess) (DC in Table 2). Further, they both wish to avoid the worst option (receiving ten years) and do not want to be the co-operative partner in the previous outcome (CD in Table 2). Although the co-operative strategy

Table 2. CC = all co-operate; DD = all defect; DC = One defects and the others co-operate, i.e. one will be a free-rider and enjoy the benefits of co-operation while the others will bear the burden; CD = One co-operates and the others defect, i.e. the others free-ride and one will bear the burden.

Order of preference of outcomes for the individual	Assurance game	The prisoner's dilemma	Deadlock
1. Best	CC	DC	DC
2. Second-best	DC	CC	DD
3. Third-best	DD	DD	CC
4. Worst	CD	CD	CD

includes the second-best option (only one year in prison), if both refuse to confess (CC in Table 2) (the best for *both* of them), each of them also risks the worst option (CD) on the assumption that the other will defect.

Consequently, both will choose defection as their dominant strategy, and produce an equilibrium that is only the third-best result for each of them (DD in Table 2). This is analogous to the example of the tragedy of the commons, where all the herdsmen increase their herds (to gain most individually) and the common land becomes degraded resulting in a decline in individual gain. Such examples are common in the exploitation of natural resources, including widespread overgrazing and over-fishing (Gordon 1954, Hardin 1968, Feeny et al. 1998).

Although this model very clearly illustrates one general framework of environmental hazards in the use of common natural resources, several critical reservations must be noted. Firstly, the use of the term 'common' in Hardin's tragedy reflects, first of all, that there is open access to the resource, pasture in this case. His prediction of the inevitability of overgrazing follows from this assumption. This assumed characteristic, usually called non-excludability or difficulty of exclusion, means that "the physical nature of the resource is such that controlling access by potential users may be costly and, in the extreme, virtually impossible" (Feeny et al. 1998). An extreme example of this would be the global atmosphere, and there are certainly others, such as the history

of offshore ocean fishery (Gordon 1954, Noonan 1998, Ruckelshaus 1998). Nevertheless, as the case studies will show, this characteristic holds only partially in many other instances of the use of common natural resources. Managing local commons is often based on a communal property-rights regime, under which members of the community have the right to use the resource while outsiders are excluded in one way or another. These cases do not necessarily lead to the problems of "open access" to additional exploiters. The regimes are usually informal and they lack "a complete set of contractual relations governing which members of the group is entitled or required to do what" (Seabright 1993). Common resources may also be owned by the state, as is the case with the reindeer pastures in Finland, or even in some cases by private owners as is the case with special fishing rights. In any case, common natural resources differ in nature, and it would be mistake to assume that difficulties in managing them will automatically arise given an unclear (and informal common) property-rights regime with difficulties of exclusion. It is therefore essential to understand the nature of the "whole host of institutional arrangements governing access to and use of the resource" (Feeny et al. 1998).

Secondly, a crucial factor in the prisoner's dilemma is that communication between the actors is normally taken to be impossible (since the prisoners are held in separate cells) or irrelevant. It is for this reason that it is usually considered a paradigmatic case of rational-choice theory, in which mutually disinterested (i.e. they are not interested in advancing or hindering any but their own preferences) individuals make their decisions in isolation. However, as many real-life examples show, even the most private decisions are rarely based on purely subjective cognitive judgements, and are rather made in an inter-subjective context. People are oriented to social-group formation, and take into consideration the needs of other individuals who are important to them, such as relatives or collaborators. They are also affected by what is considered to be compulsory or socially correct behaviour.

The third crucial point is that as the prisoners in the dilemma are in jail they cannot change the constraints imposed on them. Correspondingly, the individual herdsmen in Hardin's tragedy are

incapable of agreeing that they should mutually limit their herds. As Ostrom noted, however, not all users of natural resources are similarly incapable of changing their constraints (Ostrom 1990). She therefore considers the failures of prisoner's-dilemma-type models critical when they are used as paradigmatic models to analyse problems of natural-resource management. Although they "capture important aspects of many different problems that occur in diverse settings in all parts of the world," they are nevertheless dangerous, because "the constraints that are assumed to be fixed for the purpose of analysis are taken on faith as being fixed in empirical settings, unless external authorities change them. [... ..] As long as individuals are viewed as prisoners, policy prescriptions will address this metaphor" (Ostrom 1990).

Similarly, Feeny et al. (1998) argue that although the "tragedy" may start as in Hardin's example, "after several years of declining yields, the herdsmen are likely to seek ways to 1) control access to the pasture, and 2) agree upon a set of rules of conduct, perhaps stinting, that effectively limits the exploitation". In order to understand how this is possible, the game-theoretical model must be modified to incorporate various situations in which natural resources are managed more comprehensively. One way to do this is to use repeated prisoner's-dilemma games instead of a one-shot game. In fact, it has been shown in the literature on these repeated games that under special conditions, cooperative solutions can be spontaneously sustained given the long-term interests of foresighted self-interested individuals (Kreps et al. 1982, Axelrod 1984, Taylor 1987, Bardhan 1993).

The idea that repetition of the prisoner's-dilemma game can sustain cooperation is based on the thinking that individuals tempted to defect may be dissuaded from doing so through the fear of losing the benefits of cooperation in the future. As noted above, however, the sheer repetition of the game is not enough to ensure this (Luce and Raiffa 1957, Seabright 1993). If the game is to be played a fixed number of times, then both players will know before the last repetition that defection in the last round cannot be punished, and that therefore co-operation is unlikely at that point. Reasoning "backwards", therefore, they

will choose to defect from the very outset.

Hence the benefits of future co-operation must be sufficiently probable to act as an incentive to co-operate in the present situation. This depends, firstly, on the future benefits not being discounted too heavily and the present short-term rewards of defection not being too high (Taylor 1987, Bardhan 1993). Secondly, as Seabright points out, in a situation in which co-operation is fragile, the degree of trust the actors have in one another plays a crucial role (Seabright 1993). If that is the case and the decision to co-operate is conditional upon the expected contributions of others, the order of strategic preference is not the same as in the prisoner's dilemma. Individual herdsmen would in fact be more likely to co-operate in such a situation, even if they might hesitate to do so because they are not sure if the others will also co-operate. The typical situation would then be that of an assurance game rather than a prisoner's dilemma (Sen 1967, Runge 1984, Taylor 1987, Gillroy 2000).

The preference structure of an assurance game is essentially different to that in the prisoner's dilemma. The order of the top two preferences is reversed so that the individual prefers a joint co-operative solution to unilateral defection: all the herdsmen will prefer to limit the sizes of their herds to make sure that the total level of grazing is sustainable, as long as they can be assured that others will do so as well (see Table 2).

This change in the order of preference is essential for an analysis of social dilemmas as policy disputes. As long as this type of assurance (trust) can be guaranteed, individuals will act according to the assurance game, but if it is lacking, the situation deteriorates into the prisoner's dilemma or even worse. The worst situation in game-theoretical terms would be that individuals would prefer defection as a dominant strategy even if they acknowledged that this would lead to the total ruination of their common resource and thus reduce their options. Quirk described this strategy as a "deadlock", which "leads to a conflict as a stable outcome" (Quirk 1989).

In the following analysis, these three game-theoretical models are used as a heuristic device in analysing different stages of the kinds of policy disputes typically present in the use of natural resources. This analysis is intended to show why

and in what circumstances a prisoner's-dilemma-type situation may occur. Moreover, the models are used as a basis for investigating the policy options and institutions that could facilitate a return from the prisoner's dilemma to the conditioned co-operation of assurance game, and improve the co-operative solutions adopted jointly by the resource users themselves. We will also explore some institutional devices that could prevent prisoner's dilemmas from arising in the first place, and thus enhance the stability of co-operative solutions in the use of natural resources.

4 Policy Disputes: from Disagreements to Conflicts

4.1 Categories of Policy Disputes

Policy disputes are divided into three categories: *policy disagreements*, *policy controversies*, and *conflicts*. The first two concepts refer to disputes in which the individuals follow the strategy of an assurance game. Although they may disagree on factual knowledge, or on the values they attach to this knowledge, they are nevertheless assured of the co-operation of the others. In many cases, however, the inability of political institutions to resolve policy controversies escalates into open conflicts in which the mutual trust needed in an assurance game is lost, and the parties choose a strategy corresponding to the prisoner's dilemma or a deadlock situation.

4.2 Policy Disagreements

Policy disagreements are "disputes in which parties to contention are able to resolve the questions at the heart of their dispute by examining the facts of the situation" (Schön and Rein 1994). According to Schön and Rein, these disputes can be settled by recourse to evidence with which all of the contending parties will agree.

Policy disagreements about the use of natural resources may, in the simplest cases, concern differences of opinion about scarcity, such as the amount of lichen in the pastures of a reindeer-herding co-operative. If all parties could agree on

a suitable research method, and agree to accept the results and any actions justifiably based on them as valid, then this type of disagreement could be settled fairly straightforwardly. Similarly, by agreeing on a definition as to which types of old-growth forest have a high conservation value, and by carrying out an approved inventory of them, an agreement on protected areas could duly be established.

However, several characteristic features of most modern policy disputes concerning the use of natural resources make them difficult to resolve purely by examining facts and having recourse to evidence. These features are well illustrated in our first case: reindeer herding (LUIAS).

4.2.1 Case 1: The LUIAS Project – Reindeer Herding and Land Use Conflict Management

Reindeer herding together with fishing and hunting are the oldest means of livelihood in northern Finland. Practices have evolved over hundreds of years, from wild reindeer hunting to the herding of semi-domesticated animals. Many market-economy principles were adopted in herding practices towards the end of the 20th century, thereby increasing its status as a livelihood. Although it remains a highly traditional activity, reindeer herding has adopted modern technologies and practices. It is not the only form of land use in northern Finland, and competing activities include tourism, forestry, hydropower generation and nature conservation.

Finnish reindeer herding is regulated by the Reindeer Management Law of 1932 (revised in 1948 and 1990), which restricts the free grazing of reindeer to the Province of Lapland and the northern parts of the Province of Oulu. This region is currently divided into 56 reindeer-management districts – co-operative units known as *paliskunta* in Finnish, each of which is represented in the Reindeer Herders' Association (*Paliskuntain yhdistys*). This association is funded by the government to provide management and advisory services for the whole reindeer-herding community. A distinctive trait of Finnish reindeer herding is that both Sámi and Finns can own and herd reindeer, but only within the co-operative

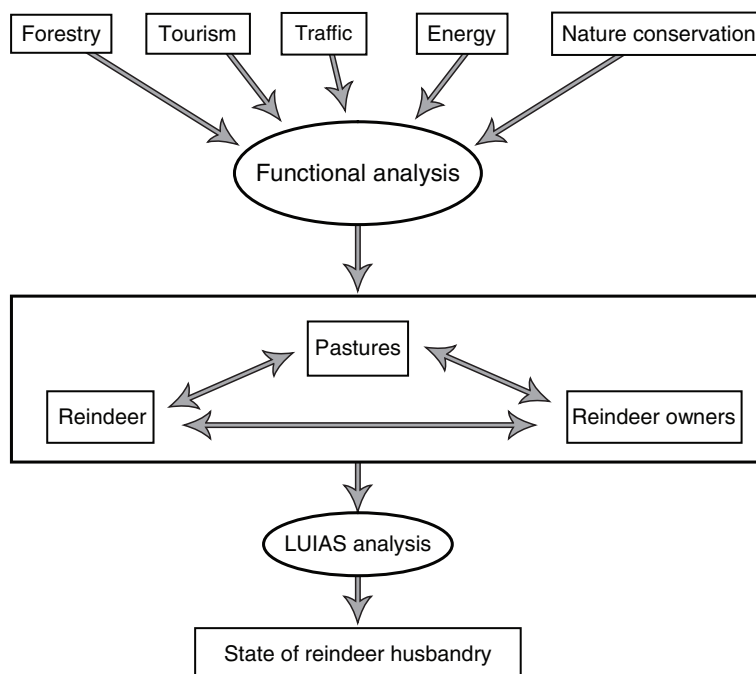


Fig. 1. The Land Use Interaction Analysis System (LUIAS).

system of the *paliskunta*. The total number of reindeer per district is regulated by the Ministry of Agriculture and Forestry, and each district is given a quota defining the number of reindeer that can be kept during wintertime. The quota depends on the carrying capacity of the winter pastures, and is reassessed on a ten-year basis.

Present-day reindeer herding faces problems affecting profitability and the use of pastureland. One major problem is related to the fact that the economic carrying capacity of winter pastures has been exceeded in many areas due to overgrazing and the effects of other land use (Kumpula 2001). This has made reindeer herds more and more dependent on supplementary winter feeding, although at the same time, feeding also stabilizes and increases productivity (Kumpula et al. 2002). Theories of pasture use such as the tragedy of the commons and the prisoner's dilemma are oversimplifications, and are not directly applicable to the present situation involving several competing forms of land use. This situation could better be described as tribal, involving conflict and struggle

within and between different groups.

There are, broadly speaking, four major forms of land use in northern Finland: reindeer herding, forestry, tourism and nature conservation. These activities have their own histories, cultures, practices and socio-economic importance. These different economic activities use the same area, but their intensity varies over time and space. In terms of land use, the requirements and operational mode may be conflicting, even incompatible.

It is clear that these users are all linked by a complex network of interrelationships with both positive and negative feedback. Individuals may belong to one group, or to several, and may thus both herd reindeer and provide tourist services. In many cases individuals' views are based not only on facts but also upon hearsay and prejudice. A good example of this concerns perceptions of the reasons for the deterioration of the lichen pastures. During the 1980s this was attributed to air pollution coming from Russia. Air-quality measurements contradicted this notion, however, and in fact on the other side of the Russian border the

lichen pastures were thriving (Tikkanen 1995). Only in the 1990s was it accepted that overgrazing was the main reason for the degradation of ground lichen pastures. It is nowadays acknowledged that other forms of land use also affect reindeer pastures. Clear felling of old-growth forest rich in arboreal lichens, land development and other large-scale activities all increase pressure upon the remaining pasture areas.

In order to arrive at a more comprehensive understanding of the relationships between the various forms of land use it is necessary to determine the underlying socio-economic structures and their physical effects. As a part of the SUNARE programme the LUIAS (Land Use Interaction Analysis System) theoretical model was developed in order to provide a framework within which to study interrelated and conflicting forms of land use (see Fig. 1).

A lot of work on evaluating and monitoring the state of Finnish reindeer pastures has been done during the last decade (Colpaert et al. 1995 and 2003, Kumpula et al. 1997 and 2004), and studies on interdependencies between pasture resources, reindeer herds and herding practices have been conducted (Kumpula et al. 1998, 2000, 2002). On the basis of this work, it could be said that the state of winter pastures in particular has deteriorated markedly in recent decades as a result of the over-utilization of pasturage areas for reindeer herding and other land-use practices. The state of the pastures has also had clear effects on the productivity of reindeer herds, although supplementary feeding is increasingly being used to support natural winter fodder resources, and the deterioration of winter ranges therefore has only marginal negative effects on present-day herd productivity. On the other hand, the supplementary feeding also increases the costs of herding and the economic benefits of feeding are thus marginal.

Forestry affects reindeer herding particularly where old-growth forests are felled, since they form an important pasture resource with their arboreal lichens for reindeer and probably also have some other advantages since reindeer clearly prefer them, especially in late winter. Moreover; logging residue in felling areas and the later development of dense sapling stands and young forests may well inhibit the growth of ground

lichens (Kumpula et al. 2002, Kumpula 2003). Logging residue also hampers reindeer digging for lichens in winter and they thus actively avoid new logging areas. Even though present-day forestry does not seem to change local snow conditions, it may affect reindeer herding indirectly because it operates most intensively in low-elevation forest in which snow and digging conditions are most favourable for reindeer.

The effects of tourism are both local and regional. Ski resorts, for instance, have a local effect, reducing the use of the surrounding pastures. Snowmobile safaris disturb herding in a large area, however. On the other hand, tourism may also benefit local communities by providing welcome additional income from services and the sale of handicrafts and meat products.

Nature conservation only limits the use of pastures in a few small areas. The main conflict between reindeer herders and conservationists concerns the protection of predators such as wolverines, wolves, bears and eagles – all of which can damage the herds. On the other hand, nature reserves protect old-growth forest, which is beneficial to reindeer.

Functional analysis of the major competing types of land use could provide insights into the relative impact upon pastures, reindeer, and ultimately on the reindeer owners. Both socio-economic and physical properties should be taken into consideration. Much effort is put into quantifying the spatial impact, in order to estimate the amount of pasture being lost due to each specific form of land use and the economic benefits and costs caused by this. The LUIAS model can only provide the basic facts, however, since ultimately values also have to be recognised, and choices have to be made through discourse.

4.2.2 *Knowledge Problems of Complex Multiple-Use Resources*

Even though agreement on the scarcity of a resource could be established based on scientific knowledge, uncertainty concerning the sustainable total appropriation level might still remain a source of disagreement. As the first case study conducted within the LUIAS project revealed, understanding the exact structure of the resource

system itself – its boundary and internal characteristics – is essential to any agreement on the sustainable use of a natural resource, and this can be a demanding job.

For instance, a typical situation is that different forms of land use – such as reindeer herding, forestry, tourism and nature conservation – compete for the use of the same area, thus competition is not limited to the herdsmen contending for the same pastures. The individual actors and communities as a whole are not necessarily aware of all the potential effects of their own or others' actions. In many environmentally problematic cases, the choice between different options is also far from clear. Often it is impossible to recognise which options would mean the environmental loss of the common resource.

In many cases, as in LUIAS, difficulties in determining the optimal policy option are, to a great extent, caused by the limited understanding of the complex network of interrelationships in the multiple use of a resource. Furthermore, the knowledge available may incorporate major uncertainties, some of which might be difficult to resolve. These difficulties could be described as *knowledge problems* of policy disagreements. It could be argued that, at least in principle, any knowledge problem could be resolved by using better and more accurate scientific methods to set out all the facts and potential consequences of any strategic option. Scientific models such as the LUIAS model could be of great help in this respect.

Nevertheless, as in the LUIAS case, even with the most comprehensive and precise models, collecting the data and quantifying the complex network of effects may be laborious and costly. According to the management literature one way of overcoming the knowledge problems connected with complex natural resources is through the “skilful pooling and blending of scientific knowledge and local time-and-place knowledge” (Ostrom 1990). One reason for this is that local users can produce valuable and often the most accurate information about the resource, on the basis of which its sustainable use can be determined. If this is done as a by-product of the use, it would minimise the costs of data gathering.

At the same time, it has been argued that users are more committed to a management decision

when it is based on information they can monitor themselves. This would, in turn, allow the organisation of management activities in “multiple layers of nested enterprises”, in which larger management units are imposed on former smaller local units. Skilfully done this could decrease management costs (Ostrom 1990, Seabright 1993).

However, organising a management system based on multiple layers of nested enterprises could also be a source of greater disagreement. Hence, it is crucial to pay attention to the whole existing resource-management structure. In the case of reindeer herding and Metsähallitus this is addressed later in the context of our third case study (Section 4.3.2). Before that we introduce our second case of commercial lake fisheries as an example of the difficulties created by different types of knowledge at distinct levels of management.

4.2.3 Case 2: Commercial Lake Fisheries – Different Types of Knowledge and Differing Views on the ‘Right’ Management Scale

Finland's lake fisheries comprise a multiple-use system. Commercial, recreational fishing and fishing for household use typically occur in the same waters that belong to the environment of summer cottages and permanent dwellings. The management of these fisheries is organized on three levels. On the local level are the shareholders' associations, a form of private ownership, according to which all owners of the lakeside land are entitled to participate in the decision-making. Between the local and the district levels are Finland's 226 fisheries regions, a state-initiated level of co-management that aims to unify the actions of local management, and the maintenance and use of the resource within ecologically coherent areas. The main interest groups, including the representatives of the owners, commercial and recreational fishers, are entitled to participate at this regional level, and the local landowners form the majority. The regions include an average of 50 shareholders' associations. On the county level of State administration, the fisheries district is responsible for the supervision of public interest

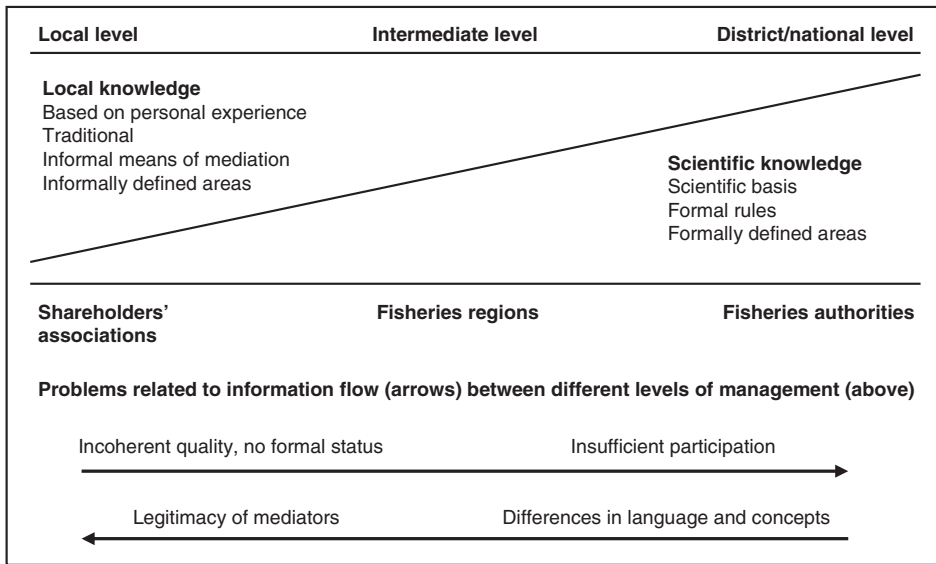


Fig. 2. The main types of knowledge, their use on different levels of fisheries management and some problems related to the utilisation of several sources of knowledge.

and for law-enforcement concerning fisheries.

Fishery interests have changed fundamentally in the past few decades to focus on recreational and other non-economic activities (see e.g., Lappalainen 1998), making the diminishing group of commercial fishers the sole party with an economic interest in the fish resource. The decision-making on licensing commercial fishing takes place in shareholders' associations. Fragmentation and a lack of co-operation between these management units raises the question of the sustainability of the system (Muje et al. 2001, Salmi et al. 2002). The fishers have expressed a need for wider licence areas (Salmi 1997, Nykänen and Muje 2005).

The aim of the INSURE research programme was to promote the sustainable use of fish resources in commercial inland lake fisheries. The idea was to combine several lakes into a new management unit, an interlocked fishing district. This would allow the fishers to utilise the fish stocks according to the spatial dynamics of the resource, thus making it possible to avoid fishing in areas with low stocks and to enhance biological and economic sustainability. By modelling an interlocked fishing district it was shown that both

biological and economic sustainability could be enhanced if such a unit encompassed several separate fish stocks (Muje et al. 2004). Matters to do with knowledge and scales of management are discussed in the following in the light of surveys and some earlier studies conducted in this context.

Commercial fisheries typify the kind of resource utilisation in which different types of knowledge often hold contradictory positions. Local actors value practical experience and traditional knowledge, while both local and scientific knowledge are used in fisheries regions (Salmi et al. 2002), and the regional authorities are largely dependent on expert knowledge (Fig. 2). If a multiple-stock approach were adopted as a basis for the management of a commercial lake fishery, the shareholders' associations would require more scientific knowledge to complement the local knowledge (Nykänen and Muje 2005). Commercial fishers typically rely on local knowledge in practice, but scientific information is also widely accepted because it often supports their views on the state of stocks, the effects of fishing, and how fisheries should be managed (Salmi 1997).

The essential differences between local and

scientific knowledge concern the geographical extent of the area from which it can be gained, and the varying values attached to it. Local knowledge is typically based on the practical experience of fishers in terms of where and when fish can be caught, in what numbers, and by which methods. It also covers the age distribution of the catch, which can be used to predict the future state of the stock, and information on past and present uses of the resource. This experience is gained locally and passed on, in some cases over many generations. It is knowledge that accumulates and is shared, so that each fisher knows much more than he or she would from their own experiences.

Scientific knowledge, in contrast, emphasises uniform sampling methods, and is typically acquired over a shorter period of time. Due to its looser link to fishery, it can seldom be obtained continuously or extensively (such as from the 44% of inland lake area in which commercial fishing presently occurs; Nykänen and Muje 2005). Despite these differences, the substance of local and scientific knowledge is often similar. Knowledge-related contradictions seem more often to be derived from the relationships between the actors than from any differences in the contents of the knowledge they hold.

Another important characteristic of lake fisheries is that, on the local level, there are often several parallel management units (shareholders' associations) working side by side on each lake. This fragmented system has evolved through the close linkage to land ownership. The division into "parts of a lake" has its origins in the late 19th century, when areas of water for economic utilisation were allocated to rural estates. Shareholders' associations were established on a large scale in the 1950s on this basis, and there was no obligation to establish coordinated management measures, such as licensing for commercial fishing. The decisions of the shareholders' associations concerning the use and maintenance of their resources could be coordinated by the fisheries regions, with each association supplying the region with a permit to act in its area, or to apply the region's recommendations in its own actions. Another option involved co-operation between the shareholders' associations within smaller areas.

Due to the structure of the management sys-

tems, and in many cases to deficiencies in the co-operation between the shareholders' associations and the fisheries regions, relevant information on the resource in the case of local knowledge fails to be passed on to other actors over wider areas (Muje et al. 2001, Salmi et al. 2002; see Fig. 2). In the case of scientific knowledge, relevant information often fails to diffuse to local decision-makers for various reasons. The most common of these concern problems in information flow: expert knowledge may be rejected due to doubts about the legitimacy of the 'experts' as actors in the field, or there may be clear differences in the substance, concepts and language of local and expert knowledge (Muje et al. 2001). Fishery-related knowledge may also be acquired from outside of the management institutions and the fishers' own experience. Where management and commercial fishing are concerned this is less common, and depends on the fishers' own activities (Lappalainen 2001, Salmi et al. 2002). Local knowledge is sometimes used for scientific and management purposes on a wider scale, such as in vendace monitoring (Valkeajärvi et al. 2002), but it typically lacks institutional status.

As local owners play a dominant role in the decision-making, even on the district level, the main type of knowledge involved is based on local peoples' personal or traditional experience of the fishery (Salmi and Muje 2001). All major management features – such as the state of the stocks, the intensity of the fishing and any possibility to adjust it, and the consequent effects on other uses of the area – are considered by several relatively independent units. These units often have limited ecosystem-level information on the resource, and a low level of consensus on management goals – other than agreement on the need to avoid an unspecified 'excessive level of fishing'. Yet the use of local knowledge is also important in the management of wider areas. There is not enough scientific knowledge available, and on the other hand, acceptance of local knowledge as an information resource on all levels of management can greatly contribute to the legitimisation of unified management measures on the ecosystem level. Local knowledge is also the only regionally extensive information resource for any single water ecosystem. This applies specifically in Finland, where lakes and fishing have been,

and still are, a close and important part of the living environment surrounding the permanent residences or summer cottages of the majority of the Finnish population.

Commercial fishing typically requires an area larger than that covered by one or two shareholders' associations (or the state-owned public waters on nine large lakes), and is thus dependent on many local actors. Licensing policies may therefore vary greatly within a single lake, depending on the owners' attitudes. For the owners, economic values are usually only of minor significance in the decision-making processes (Nykänen and Muje 2005). Local owners are concerned about the maintenance of fish stocks, the side effects of the fishery (such as by-catch or noise), and the effect on their own fishing for household use (Tonder and Muje 2002). Vendace, the main catch in commercial lake fisheries, can only be maintained by regulating the fishery, and not by stocking (Viljanen 1988).

Both scientific and local knowledge are important to the ecological and social sustainability of commercial fisheries management. At present, however, the application of scientific knowledge and the accumulation of local knowledge are both suffering due to the excessive number of decision-making bodies involved in any single water area on the local level, and due to vertical disputes between local and central regulators.

4.3 Policy Controversies

4.3.1 *From Divergent Interests to Differing Frames*

As is clear from the cases of reindeer herding and lake fishery, multiple-use situations not only complicate assessment of the various interrelationships and effects (the knowledge problem), in many cases they also make it difficult to evaluate whether or not any management option is justified in the eyes of the various users. Different options have different kinds of effects, and there are divergent views about their seriousness and probability. The conflicts between reindeer herding and competing land use as described in the LUIAS project provide a typical illustration of such a situation. Another example is the case of

forest conservation, in which there is considerable disagreement on the extent to which modern forestry-management practices reduce the need to establish protected areas.

The above cases also indicate that the choice of relevant information or knowledge depends on people's views about it and the values attached to it, rather than on its substance and possible contradictions. The social sustainability of the management of a natural resource is dependent on the use of all relevant forms of information. Whether it is relevant depends more on whether it is socially acceptable, legitimate and comprehensible to all stakeholders, than on its "correctness" or "objectiveness".

For example, uncertainty and varying interpretations of the state of fish stocks are the norm in fisheries, due to the nature of the resource and problems in assessing the stocks (Hilden 1997, Berkes et al. 2001). As the above case of managing lake fisheries demonstrates, because of the differences in the scale on which the different management levels work, and in the ways in which management information is obtained, the respective representatives "naturally" perceive different types of knowledge as their main information resource. Contradictions between levels of management or interest groups in terms of who owns the right to control fishing may emphasise the differences between local and scientific knowledge of fish stocks. The opportunity to supplement one type of knowledge with another in the decision-making may be lost in situations in which differences in knowledge are used as a basis for arguments between interest groups.

This situation could more generally be characterised as one in which two or more parties contend over the right interpretation of knowledge or over the choice of what type of knowledge to use. As noted above, different kinds of interests, including economic interests, are obviously influential in the background, and make the situation more of a struggle over the naming and framing of the policy situation itself, and over the control of the policy-making process.

A traditional pluralist would treat such a situation as a dispute among individual actors with conflicting interests using their respective powers to promote their own interests (Dahl 1989). Any policy decisions accordingly are "the resultant

of a balance among conflicting values and interests” (Coleman 1982). Disputes are like zero-sum or win-lose political games, which have solutions that can be reached through bargaining and negotiation as a form of mutually beneficial compromise.

In fact, one major challenge in environmental disputes is the *distributive problem* meaning that the losses and gains related to the use and protection of natural resources are rarely equally distributed. Environmental disputes and their resolution threaten a pre-existing structure of entitlements and raise questions of distributive justice. Whatever the proposed solution, it is likely to include costs that have to be borne by someone (Lafferty and Meadowcroft 1996, Lundqvist 2004).

Nonetheless, in as far as the disputes only concern divergent economic interests and incompatible goals, the actors could, at least in principle, have the incentive for resolution “without threatening their core identities or values” (Putnam and Wondolleck 2003). Thus we could argue that, in cases involving distributive problems, fair compensation for those who will bear the costs of a management solution would be one solution.

Nevertheless, as we will show, resolving distributive problems usually requires some understanding of why compensation provides a solution in some disputes and not in others. Addressing distributive problems in conflict management often takes the form of a win-lose political game of hard bargaining, with no easy, mutually beneficial solution. We therefore have to look at the underlying structures of beliefs, perceptions, and appreciation that determine what the disputants perceive as being in their (economic) interests. Similarly, in order to understand why different types of knowledge do not supplement each other in the management of lake fisheries, we have to consider the broader points-of-views held by the managers on the different levels.

Schön and Rein (1994) call the broader points-of-view underlying any policy dispute *frames*. Frames held by actors determine what knowledge they count as relevant and what interests they perceive as conflicting. They thus define what the actors see as being their positions in a policy situation. The difficulties arising from the differences in frame between actors are referred to here as *frame problems*.

Schön and Rein (1994) also call a situation of conflicting frames a *policy controversy*. Because frames determine what counts as a fact, and which arguments are taken to be relevant and compelling, policy controversies are regarded by researchers as resistant to resolution by appeal to factual knowledge or reasoned argumentation, as with policy disagreements. On this level, frame analysis has been used quite extensively in recent research on conflict management (see Lewicki et al. 2003). As a part of this research, different kinds of frames have been defined in order to capture the multiple aspects of various policy controversies and intractable conflicts (Gray 2003, Putnam and Wondolleck 2003). By using the frames we could try to understand actors’ interpretations of what the policy controversy is about, why it is occurring, what their own and other actors’ motivations are, and how it should be resolved.

In general, it could be argued that people usually think of themselves as belonging to certain social groupings or categories that have given characteristics (e.g., fisherman, reindeer herder, forest professional). Gray (2003) calls these ways in which we identify ourselves *identity frames*, which she distinguishes from the *characterisation frames* that reflect our understanding about others.

In many cases the repeated use of the characterisation frames may polarise already antagonistic relationships, as can be observed in the history of forest conflicts in Finland. The relations between the parties have been highly polarized in this struggle and strong rhetoric (‘forest war’) has strengthened its intensity. Because of this polarized situation, different options are not considered seriously, and the dissenting parties (mainly the forest sector and environmentalists) rather stick obstinately to their viewpoints and concentrate on attempts to influence decision-makers and the public in order to legitimate their own positions (Hellström 2001, Rantala and Primmer 2003).

During this struggle dissenting parties constitute their own institutional identities that define institutions’ “characteristic points of view, prevailing systems of beliefs, category schemes, images, routines, and styles of argument and action” (Schön and Rein 1994). On the other hand, other actors learn from these *institutional frames* what to expect from a particular institu-

tion, and what is characteristic of it in a given policy situation.

How this reciprocal framing process develops, will become evident in what follows. The Metsähallitus case also further broadens our view of reindeer herding, thereby painting a picture of an ongoing struggle over a structural challenge in changing the institutional frame of Metsähallitus. It also illustrates how institutional frames inevitably have effects on the policy options available in particular dispute situations.

4.3.2 Case 3: Metsähallitus – Structural Challenges in Changing Institutional Frames

The State enterprise Metsähallitus (The Finnish Forest and Park Service) manages Finland's State-owned forests, which account for 24% of the country's total forested area. These forests are mostly situated in Eastern and Northern Finland. Metsähallitus was originally set up 150 years ago as a State bureaucracy for forest administration. Intensive forestry methods were used throughout the country from the end of the Second World War until the 1980s, and forestry professionals remained isolated from other stakeholders (Hellström and Reunala 1995). Metsähallitus adopted a rather arbitrary style of planning and decision-making, and it was therefore generally known as a "state-within-a-state".

Since the early 1990s, however, Metsähallitus has gone through several changes related to its overall organisation and the goals and use of State forests. Natural Heritage Services was established in parallel with the Forestry Unit in 1992, and this conservation-oriented unit has since grown significantly in size and importance (e.g., *Diverse use of state forests...* 2002). Several government-initiated forest-protection programmes have been carried out on State land, while new planning approaches adopted by Metsähallitus in commercially managed forests give more emphasis to multiple use, biodiversity conservation and participatory planning (Vanhojen metsien suojele... 1996, Loikkanen et al. 1999, Karvonen et al. 2001).

Metsähallitus has been a State enterprise since 1995, with two equally important tasks defined in

the legislation (Act on Metsähallitus 1378/2004): the profitable and sustainable use of natural resources, and the conservation of biological diversity. Its annual revenue is set by the Finnish Parliament, and 85% of this income is obtained from timber sales. In addition, new business units have been established for tourism (*Wild North*), for example, and for the sale and renting of plots for holiday homes (*Laatumaa*).

Despite its role as a State business, Metsähallitus continues to have several significant social tasks stipulated by the law that restrict its economic activities. These include the promotion of employment and recreation, as well as safeguarding the needs of reindeer herding and the culture of the indigenous Sámi people (Act on Metsähallitus 1378/2004). Due to its multiple roles, Metsähallitus portrays itself as a conciliator between a wide variety of forest-related interests and needs, with a planning system designed to integrate all aspects of sustainability into the use of State-owned forests (*Diverse use of state forests...* 2002). In other words, it considers its institutional frame regarding forestry planning to have changed considerably.

However, research findings and the continuation of various conflicts related to State forests show that not all stakeholders are assured as to how thorough or consistent these changes have been (see e.g., Hukkinen et al. 2002, 2003, Harkki and Pyykkö 2005). The aim of LINK-FOREST was to promote understanding of the ways in which Metsähallitus has managed the conflicts related to state forests within the new institutional and organisational framework, and of the reasons why the strategy has left some of the key stakeholders dissatisfied.

The analysis showed that the historical background of Metsähallitus as a timber producer and the focus on its economic activities play a significant role in the way it approaches forest-related conflicts. The Metsähallitus Forestry Unit still largely holds an institutional frame that could be described as a *Forestry frame*. This has been visible in the ways in which Metsähallitus (and its governing body, The Ministry of Agriculture and Forestry) have defined and attempted to resolve the conflict between State forestry and reindeer herding in Inari, in Finnish Lapland (Kyllönen and Raitio 2004, Raitio and Rytteri 2005).

According to the Forestry frame, the extent to which forestry operations have been reduced from the potential maximum illustrates the reconciliation between forestry and other users, such as reindeer herders (Raitio and Rytteri 2005). The impact of forestry on herding is assessed in terms of annual timber harvest levels, which is the measurement unit used in forestry and the basis of the financial calculations of Metsähallitus. The effects are also assessed within the whole area of Inari or Northern (Upper) Lapland, because these are the State forestry operative units. Annual timber harvest levels in Northern Lapland fell from the record high of 270 000 m³ in 1980 to 136 000 m³ in 2005 (Luhta 1999, 75, Metsähallitus 2005). Almost half of the forests in Inari are protected, and the annual regeneration loggings cover only 0.2% of the total forest area of Northern Lapland (Ylä-Lapin... 2003, 8). Making its assessment in the light of the Forestry frame, Metsähallitus concludes that the needs of reindeer herding have been well taken into account.

Herders, in turn, possess a *Reindeer herding frame* that provides a different picture about the impact of forestry on herding. Reindeer-herding co-operatives (*paliskunta*) have legally defined geographical borders that are different from the State forestry geographical units. Furthermore, different parts of a co-operative's area have different functions as summer or winter pastures, and they are replaceable only to a limited extent.

As far as reindeer herding is concerned, the conflict is about the amount and availability of winter pastures that are outside of the forestry operations within each co-operative. The protected forest areas are unevenly distributed among the co-operatives and some of them exclude none of the forests in winter-pasture usage from forestry operations. Despite the declining harvest levels, forestry keeps spreading to previously unmanaged areas, thus increasing its impact (Reindeer herding co-operative of Hammastunturi et al. 2002). Even according to the management plans drawn up by Metsähallitus, the amount of forests over 140 years of age will decrease from close to 60% to 40% by the year 2040 (Sandström et al. 2000, 154). When assessing the conflict-management efforts of Metsähallitus in the light of the Reindeer herding frame, the herding co-operatives conclude that the pastures have not in all cases

been adequately protected from forestry.

The success of conflict-management efforts in cases like this depends on the ability of all parties to broaden their frames. Most importantly, the administrator needs to convince the stakeholders of the inclusiveness and fairness of its own frame. From this perspective, the fact that the staff of the Metsähallitus Forestry Unit – which is responsible for the integration of multiple goals into forest-management strategies – is committed to timber-production goals, could be considered a challenge.

The staff of the Natural Heritage Services Unit (and its governing body The Ministry of the Environment), on the other hand, differs considerably in terms of educational background (conservation biology rather than forestry), goals and tasks (conservation rather than forestry). Given that its task is to focus on the management of conservation areas, the Unit has not been involved in the conflict between reindeer herding and forestry, which has concerned commercial forests. Furthermore, the conflict is not primarily about ecological sustainability and therefore is considered outside the tasks of the Natural Heritage Services (Raitio and Rytteri 2005, 126). Despite increasing co-operation between the two units, they clearly have distinct roles and goals, and are less integrated than one might expect. Furthermore, neither of them has any staff to represent frames such as those of reindeer herders.

The challenges related to the institutional frame(s) of Metsähallitus and its ability to embrace other forest uses is related to the structure of the organisation. In his study on Finnish waste management, Hukkinen (1999) defined a special feature of Finnish environmental management that he calls environmental corporatism. This has the systemic property of integrating conflicting environmental-policy interests to the extent that their open political resolution is impossible. This kind of institutional mixing of conflicting interests leads to a situation in which short-term economic goals prevail whenever there is a contradiction with long-term goals. The OECD highlighted this structural feature of Metsähallitus as potentially problematic in its country report on Finland's environmental performance (Environmental Performance... 1997, 110). Since the short-term goals stipulated for Metsähallitus by

Parliament are dependent on timber sales, it is hardly surprising that this perspective dominates the institutional frame of its Forestry Unit. The challenge is to develop an organisational solution that would allow broader institutional frames to develop.

4.4 Conflicts

4.4.1 Policy and Conflict Management Frames

As the case of Metsähallitus shows, depending on their institutional identity and characterisation frames (Forestry and Reindeer herding), parties make their interpretations about the dispute at hand (see Fig. 3). Using what could be called *policy frames* they construct the problem of this specific situation (Schön and Rein 1994). According to the Forestry frame held by the staff of the Metsähallitus Forestry Unit, the problem is in reconciling the competing uses of forests – mainly forestry and reindeer herding. They consider the demands of the reindeer herders excessive given the extent to which forestry operations have already been reduced from the potential maximum. However, within the Reindeer-herding frame, looking at the total amount of reduction misses the point as long as the protected forest areas are unevenly distributed among the co-operatives.

These different policy frames have a significant impact on the way in which the parties see the possible solutions to the situation, i.e. depending on what *conflict-management frames* they have (Gray 2003). Thus, while Metsähallitus might understand the problem as a dispute between different land users within its policy frame, the

conflict-management frame would suggest intermediation by a “third party”, that is themselves, as a solution (Kyllönen and Raitio 2004). From this perspective, a fair and neutral solution might be based on accommodating – as far as possible – the varying demands of the competing users. Analysing the economic costs and benefits associated with each competing demand could be useful here, because it would enable the authority to offer a solution that maximises the net benefit of the whole area (Reich 1988).

While reindeer herders agree on the need for third-party intervention in the dispute, they do not consider Metsähallitus the appropriate third party. Because of its status as a State forestry business, as well as its corresponding Forestry frame, reindeer herders see it as one of the disputing parties. From their perspective, the resolution process is unacceptable as long as one of the parties involved makes decisions unanimously. Consequently, the herders have demanded that the Ministry of Agriculture and Forestry intervene as a third party and start formal negotiations with all those engaged in the dispute, including the herders (Kyllönen and Raitio 2004).

The Ministry of Agriculture and Forestry supervises both State forestry and reindeer herding, which provides it with a wide array of tools for devising alternative solutions to the dispute. However, it has been reluctant to intervene because it shares Metsähallitus’ policy frame as well as its identity frame as a suitable third party. This lack of response from the State led the herders to start an international pressure campaign jointly with Greenpeace and the Sámi Council, and to take legal action against the State (Finnish Sámi Reindeer Herders Association 2005, Raitio and Rytteri 2005, Sami Council 2005).

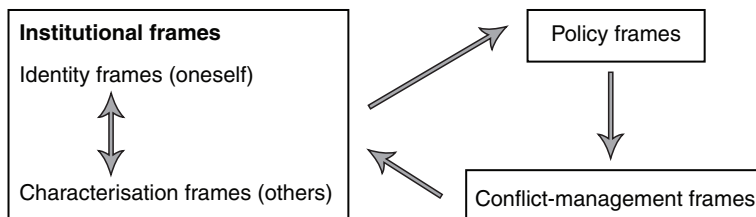


Fig. 3. Interconnected frames.

The Metsähallitus case shows that an inaccurate policy frame and the resulting conflict-management frame of the authorities can, in fact, lead to the escalation of a dispute rather than to its resolution. Moreover, the dissonance between the perceived and actual roles (i.e. the characterisation and identity frames) of Metsähallitus undermines the credibility of efforts to resolve the dispute.

4.4.2 *The Assurance Problem*

As noted above, frame differences can foster the escalation of policy disputes in many ways. They may lead the disputants to adopt adversarial conflict-management strategies that impede resolution. Sometimes, too, actors may not frame the underlying problem in the same way, and this could lead to repeated dispute episodes that never address the underlying issue (Lewicki and Gray 2003). Consequently, there may be repeated failures in communication between the actors, which in turn may hinder the construction of a common understanding of a policy situation (shared policy frame). These communication breakdowns may also result in mutual distrust between actors, which would prevent co-operative strategies from emerging.

This stage of mutual distrust could be described as an *assurance problem* (see Sen 1967, Runge 1984). In such situations individual actors no longer trust each other in the sense that they feel assured that the others will act co-operatively in the use of the resource. As described above, the actors in an assurance game prefer co-operation as long as they can trust that all the others will co-operate as well. In policy controversies that still retain the form of an assurance game, therefore one possible solution would be to establish a mutually recognised resolution process.

However, as soon as the mutual co-operation of all actors can no longer be guaranteed (i.e. there is an assurance problem), individuals will try to maximise their own gain and promote their own interests. This leads everyone to prioritise and promote only their own private goals, regardless of their awareness that this would be neither the most beneficial nor the most sustainable solution overall. Where such a series of events occurs,

actors adapt their order of preference to that in the prisoner's dilemma or deadlock case.

Escalation from political controversy to conflict resembles this transformation of an assurance game to a prisoner's dilemma. Therefore a *conflict* is defined here as an escalated policy controversy characterised by mutual distrust between actors. Our next case of the Malla Strict Nature Reserve illustrates an escalation process leading to a stage of distrust.

4.4.3 *Case 4: How Contradictions Have Grown into Conflict in the Malla Strict Nature Reserve*

Malla is the oldest nature reserve in Finland, having been established in 1916 to protect its unique natural features from human damage – especially logging activities and reindeer herding – and to meet the needs of scientific research. Malla lies near the village of Kilpisjärvi, and the borders of three countries, Finland, Sweden and Norway. The reserve has a special status in the European conservation network. It belongs to the IUCN category A 1 classification, which forbids all human activity that changes the natural environment. Malla is considered to be especially valuable because of the great diversity of its flora and fauna, which is in turn due to the calcareous bedrock. The nature reserve is also important for scientific research, particularly since reindeer husbandry is not allowed (Jokinen 2005a).

However, the entire Kilpisjärvi region has traditionally been used as reindeer pasture by the local Sámi people, who are considered to be the only remaining indigenous people in Europe (Heikkinen et al. 2005c). The nature reserve is fenced only along the national borders, so reindeer can enter the park from within Finland. During the summers of 1998 and 1999, a couple of thousand reindeer from the *Gova-Labba* reindeer village grazed in the Malla area for a few weeks. Malla, as a fresh and snowy area, is important during the hottest season in July especially for the well-being and growth of the calves, and it is therefore economically important for the herdsmen (Heikkinen et al. 2005a). This situation led to a conflict between nature conservationists, scientists and reindeer herdsmen. At the request of the reindeer

herders, the Finnish Forest Research Institute (Metla), which administers the area, launched a multidisciplinary research project in 2001. The aim of the project was to assess the ecological and socio-cultural impact of allowing reindeer herding rather than continuing with the present conservation measures, or intensifying conservation by completely fencing off the reserve (Jokinen and Heikkinen 2005).

Three sets of contradictions are associated with the Malla case. The first is that between the local Sámi and certain expert scientists, mainly biologists. On the one hand, the Sámi think that the exclusion of their reindeer herds from their former pastures without compensation is historical injustice. On the other hand, because of the lack of hard scientific evidence, some experts dispute the fact that reindeer ever actually grazed in the area, and suggest that there is no real need to use it as pasture (Jokinen and Heikkinen 2005).

The second contradiction is between different groups of scientists. One group considers semi-domesticated reindeer the successors of wild reindeer, and thus sees the impact of their grazing as a natural and essential part of the mountain fell (alpine tundra) ecosystem (Oksanen 2005). In contrast, other scientists believe that reindeer are too domesticated, and that modern herding would create unnatural conditions on the fells. The symbolic status of Malla is also a major factor, because some people see it as the 'last of the last' untouched, 'indigenous' (Finnish term *alkuperäisluonto*) and pristine ecosystems in Finland, although it is not very typical of Finnish fell nature because of its extraordinary lush vegetation and rare species. Moreover, the Sámi, whose ancestors populated this region long before the Finns, have quite a different view on the "indigenous" character of their home region and its appropriate usage. The key contradictions concern what species, ecological conditions and human activities are acceptable in Malla – and on what basis and to what extent (Jokinen and Heikkinen 2005).

The third conflict dimension concerns two reindeer villages, both associated with the Malla reserve. The Sámi Reindeer culture, like traditionally pastoralist communities in general, is rather family-centric, and often competitive regarding strategic natural resources such as pastures. Traditionally the strong-

est and most skilled families have occupied the best pastures (Pehrson 1964, Heikkinen 2002). In modern times, however, official administrative organisations such as Metla now manage natural resources according to Western legal and democratic traditions. In the Malla case, these two separate traditions, each operating in their own local or institutional social domain, are difficult to combine (Jokinen and Heikkinen 2005).

Even if an agreement could be reached between the administrator and one village on the strict control of herding in the reserve, for instance, the internal conflict between families could still threaten the sustainable use of the natural resources. It has been argued that the worst scenario, i.e. "the tragedy of the commons", could emerge, and competition between families could lead to a situation in which each one freely tries to take maximum advantage of a newly available resource. In any event, understanding the dynamics of traditional cultures is also essential in order to avoid catastrophes in terms of sustainability (Heikkinen et al. 2005a).

The Malla case has also taught us that contradictions between different actors are not necessarily so massive at first, but several communication breakdowns may create stronger biases. In this case, these biases were initially a consequence of different perceptions of the situation, but then secondly also the result of mutual distrust on all levels of interaction. The first issue, as described above, concerned the role of human culture in the local fell ecosystems. On the one hand, reindeer herding is perceived as a natural element of the ecosystem, while on the other there is a perceived need to exclude reindeer herding in order to preserve the natural state of the area. These basic contradictions deepened into open conflict fuelled by mutual distrust when both sides, without first entering into negotiations, gave their own views on why reindeer entered the reserve in the late 1990s. Some experts said that the herders deliberately drove their reindeer into it, while the herders said that, due to a period of prevailing westerly winds, they could not keep control of their herds, which invaded the fresh summer pastures of Malla. Moreover, there was a breakdown in communications between the different scientists, and this led to misunderstandings, including the circulation of a rumour that a forthcoming study

would propose allowing reindeer herding in Malla (Jokinen and Heikkinen 2005).

When the negotiations and project planning eventually started in this situation of mutual distrust, many negotiable issues were already excluded from the discussion. Even the scientists were not open-minded in terms of academic debate. One characteristic of the situation was that all of the actors thought that Malla was a very important area. They also all seemed to see themselves as nature conservationists, and as friends of the Sámi people. It was, in fact, very difficult to get the different actors to talk openly about their views, and consequently each side merely guessed what the others thought or were planning to do (Jokinen and Heikkinen 2005).

The social objective of the Malla project was to reopen communications between the different actors by creating new forms of interaction. In fact, many parties had not met each other before the conflict arose. To enhance mutual understanding and the communication of ideas, several meetings and seminars were arranged for scientists, officials and reindeer herders. An e-mail list was also set up to enhance open academic debate, but this mainly served as a discussion forum for a couple of scientists, since most of them did not take part and did not express their opinions even though they were asked to do so. Social tensions between different actors, including herders from the reindeer villages, also suggested the need for improvements in co-management practices.

Without the acceptance and co-operation of every party, no agreement concerning nature conservation or reindeer herding will last in the long run. The Malla case illustrates how building mutual understanding and shared co-operative frames requires 'old-fashioned' face-to-face communication in conditions in which all parties feel at home. Hence it is essential to arrange seminars on neutral territory. History inevitably creates its burdens, and the mutual distrust between the Sámi and the state authorities will not be dispersed easily. The Malla case also exposes severe weaknesses in scientific nature-conservation arguments, and shows how easily knowledge gaps provoke personal conflicts rather than open academic debate. If scientists are not able to communicate, and eventually agree with each other, about nature-conservation targets, arguments and

necessary actions, then how can the authorities convince lay people about the need for nature-conservation areas and for their protection? (Jokinen and Heikkinen 2005, Jokinen 2005b).

5 Options in Getting Back from the Prisoner's Dilemma to the Assurance Game

5.1 The Politics of Assurance

Earlier we introduced three basic game-theoretical models of social dilemmas: two in which non-cooperation is the dominant strategy of the actors (the prisoner's dilemma and deadlock), and one in which co-operation is the first option but it is conditional on the expected contributions of others (the assurance game). Furthermore we distinguished three categories of policy disputes and used case studies to illustrate the characteristic problems (knowledge, frames, distribution and lack of assurance) generating disputes in each category. Fig. 4 illustrates how the three categories of disputes and the problems associated with them fall within the framework of game-theoretic models of social dilemmas.

The problems that generate the three types of disputes should be seen as interrelated. As the cases show, frame problems are likely to include distributive and knowledge problems, and lack of assurance is likely to be associated with problems related to knowledge, distribution and frames. The importance of distinguishing between these three types of disputes lies in the fact that, despite their interrelatedness, they call for somewhat different management strategies. Particularly if a dispute has already escalated into a conflict, it is essential to focus on re-establishing the lost assurance, which is not likely to be achieved by addressing knowledge and frame problems alone. On the other hand, as became evident in the Malla case, providing assurance is highly dependent on how issues concerning knowledge, fair distribution and frame differences are settled.

In his analysis of environmental policy, Gillroy (2000) ends up advising policy-makers to "shift to the politics of assurance", as this could facilitate the return from a prisoner's dilemma to the con-

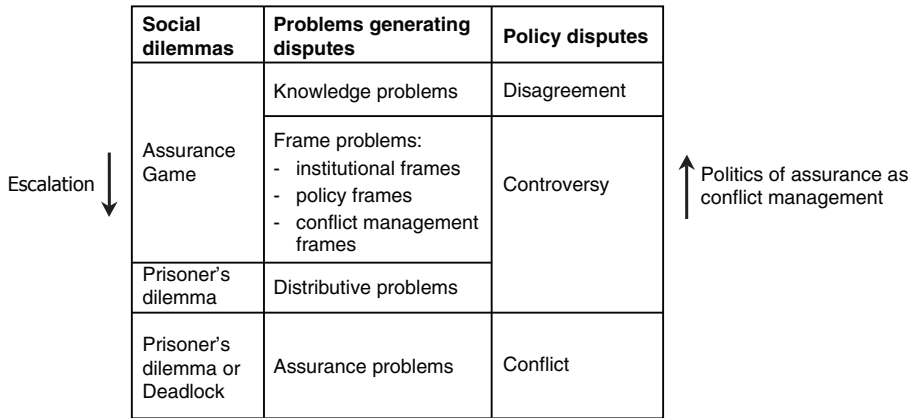


Fig. 4. From dispute to conflict within the framework of game-theoretical models of social dilemmas.

ditioned co-operation of the assurance game. Our aim in what follows is to investigate the options of such “politics of assurance” and the elements of a successful conflict-management strategy that would improve the co-operative solutions adopted jointly by the resource users themselves. Our last case study, which focuses on the regulation of water levels in Lake Päijänne, brings out the elements of emerging co-operation.

5.2 Case 5: Lake Päijänne – How Consensus Can Be Achieved in the Regulation of Large Watercourses

Most large lake-regulation projects in Finland were carried out during the 1950s and early 1960s without any major environmental-impact assessment (EIA), and for many years the only way to resolve conflicts was through the Water Court process. At worst, these judicial processes took decades, wasted huge amounts of financial and mental resources, and only served to intensify the conflicts between the interest groups. As a consequence, there has been increasing interest in finding other ways to resolve conflicts related to the regulation of watercourses. This aim has even been written into Finland’s Water Act, which was revised in 1994.

According to the Water Act, such development processes should consist of two phases.

First, possible ways of alleviating the impact of current regulation practice should be assessed in co-operation with the authorities and the major stakeholders. Once that has been done, it is possible to apply for revisions to the current regulation licence, or to suggest new control rules if there are no other ways to alleviate the adverse effects. In contrast to the former *dispute approach*, these new approaches could be described as *co-operative*, and have been successfully applied in several large and controversial lake-regulation development projects in recent years.

One of the best examples of this new approach to conflict management is the Lake Päijänne regulation-development project. Lake Päijänne is the second largest lake in Finland (ca 1000 km²). It was last subject to regulation in 1964, the original objectives being to increase hydropower production and to reduce flood damage to farmland around the lake and the Kymijoki river. Nowadays, the lake also has extensive recreational housing developments along its shores, and tens of thousands of people use it for recreation and fishing. There has been growing public interest in reconsidering the regulation policy to better take into account the increased recreational use and increased environmental awareness.

The Lake Päijänne case is a typical environmental decision problem to which all conflict models can be applied to some extent. However, the majority of the conflicts originated from con-

flicting interests and the lack of knowledge concerning the objectives and impact of water-level regulation. At the beginning of the project there was a limited amount of scientific information available on the effects of regulation. Discussion was therefore easily dominated by personal experiences and general beliefs, and potentially biased given the problems in recognising the real effects. For instance, it was very difficult to differentiate water-level or flow changes caused by regulation from natural water-level fluctuation. On the other hand, benefits such as flood prevention can only be assessed by hydrological models. Elderly people in particular, who remember the "good old days" before regulation and may have experienced dramatic changes in their living environment, may have strong negative feelings about water-course regulation. In some cases, prolonged Water Court processes lasting even decades have also nourished the dissatisfaction.

The Lake Päijänne project involved few conflicts of basic principles as the aim was to develop a new ecologically and socially more sustainable regulation policy and not to introduce new water-course regulation. However, there were some people whose opinion was that man does not have the right to modify the natural discharges of watercourses, and who therefore called for a return to natural water levels.

The multi-disciplinary research project was carried out in 1995–1999 in order to re-evaluate the Lake Päijänne regulation policy (Marttunen and Järvinen 1999; Hämäläinen et al. 2001). The aims were to assess the ecological, economic and social impact of the regulation, and to compile recommendations to reduce the harmful effects. At first there was strong distrust in the project and the organisations responsible for it, especially among fishing community. The Finnish Environment Institute (FEI) and the Ministry of Agriculture and Forestry (MAF) were not considered impartial, because at that time the FEI was responsible for the regulation of Lake Päijänne, and the MAF was the permit holder of the regulation licence. There were also some historical reasons for this distrust. An open and participatory planning process was therefore considered to be necessary in order to gain public support, and to find a consensus-based solution for the future regulation strategy.

Postal questionnaires, workshops, public hear-

ings and working groups were used to find out the opinions of the local people. All in all, there were more than 50 meetings and more than 100 people attended them. In order to involve a wider public, a postal questionnaire was sent to over 2 000 property owners. The most important forum for stakeholder involvement was the 18-member steering group, which included representatives of public authorities and various interest groups. The role of the steering group was to discuss and accept the project plan and annual working plans. However, its most crucial task was to compile recommendations that were acceptable to all stakeholders involved.

The work of the steering group was supported by decision analysis and mathematical models. The methods were applied complementarily and each of them had their own aim and role in the planning process (Hämäläinen et al. 2001). An essential part of the participation process comprised the *decision-analysis interviews* conducted with the steering group. This involved the use of the HIPRE model (Mustajoki et al. 2004) in the canvassing of opinions among the representatives of the steering group regarding regulation-policy alternatives and the significance of their effects. The HIPRE model calls for the evaluation of alternatives with respect to each attribute and their weighting according to their relative importance. A total of 20 personal interviews were conducted using the software.

The Lake Päijänne regulation-development project was a very interesting case as far as experts and researchers into multi-objective decision-making were concerned. On the one hand, it offered an opportunity to work with decision makers in a real-life case. On the other hand, it proved to be a good arena for testing decision-analysis methods in the collaborative planning process due to the fact that there were multiple objectives, many involved stakeholders, extensive data and the need for trade-offs.

Our experience suggests that the decision-analysis interview method (Marttunen and Hämäläinen 1995, Marttunen and Suomalainen 2005) offers a systematic framework for analysing and discussing objectives, values and trade-offs. It also promotes overall understanding of the multi-faceted and complex planning situation. Furthermore, stakeholders found the methodology very

interesting, and even necessary, as there was an articulated need for a method that facilitated comparison of ecological, social and economic effects. Multi-Criteria Decision Analysis (MCDA) made the participants more aware of their own values and objectives and of their importance. In addition to that, improved understanding of the problems, concerns, and objectives of other stakeholders helped in the creation of regulation policy options that were better and socially more acceptable than the previous regulation policy. The use of MCDA enabled the consideration of multiple effects and objectives, although many of these were of minor importance in the final decision-making. This feature made it well suited to the consensus-seeking approach (see e.g., Janssen 2001).

At least six positive elements in the process ensured that a consensus solution could be reached:

- 1) Comprehensive studies greatly improved knowledge of the ecological, social and economic effects of regulation – providing a very good basis for rational decision-making. The new information also changed preconceptions that could have been either too positive or too negative.
- 2) Increased understanding of lake regulation and the preferences of various stakeholders improved their ability to put themselves in other stakeholders' shoes. Consequently, this made it easier for them to accept a solution that was not the best possible from their perspective. The decision-analysis interviews played a crucial role in this learning process in that they improved both the overall understanding of this complex problem and the communication, while also facilitating the articulation and analysis of respective values. The decision analysis also clarified the differences between the stakeholders' values and their importance in the comparison of alternatives.
- 3) A considerable amount of trust developed between the various stakeholders during the project. This was mainly due to the open and participatory nature of the whole process. Additionally, the results concerning the ecological impact were in accordance with the opinions of the local people. This was important because it partly increased confidence that the aim of the project really was to determine the effects of regulation in a neutral way.
- 4) The development of lake regulation was not a zero-sum game. It was possible to find a practice that would reduce the harmful effects on the water ecosystem and on recreational use, while also taking into account the original objectives of the regulation. During a dry spring, for instance, it is possible to raise water levels and thus to improve conditions for recreational use and for the reproductive practices of spring spawning fish without increasing the flood risk.
- 5) The process used in the Lake Päijänne case resembled the environmental-impact-assessment approach that has been widely used in planning large construction projects, such as motorways and flood-protection systems. One major difference was that in this case EIA was not a distinct phase of the planning process, and the decision-making and planning were closely connected.
- 6) Had a consensus solution not been achieved, then the Regional Environment Centre, the municipalities or the fisheries authorities would have been able to take the issue to the Environmental Permit Authority. However, due to the negative experiences in the past with these processes, it was not in the interests of any group to reject the recommendations and thereby provoke legal proceedings, although the realisation of the recommendations required modification to the current regulation permit to the extent that environmental court proceedings were required. Nonetheless, there has been only one objection to policy revision during this process, which is a very low number given the high number of people and stakeholders using Lake Päijänne and the Kymijoki river. This suggests that the participatory process was effective in allaying some concerns over the project.

6 Discussion

6.1 Problems of Supply, Commitment and Monitoring in Resolving “The Tragedy of the Commons”

The Malla case and the dispute in Inari between Metsähallitus and the reindeer herders gave us examples of an escalation process leading to a conflict situation in which the actors followed the non-co-operative strategy of the prisoner's dilemma instead of the co-operative strategy of

the assurance game. In game-theoretical terms this process could be described as a “trigger strategy” of co-operation: the initial stage of conditional co-operation (i.e. the assurance game) ends after one or more actors have acted non-co-operatively so that they all adopt the prisoner’s dilemma’s non-co-operative strategy (Elster 1989).

Once this has happened, returning to the co-operative strategy might prove difficult, since at least the following conditions are crucial for co-operation to occur in the first place in a repeated prisoner’s-dilemma game:

- 1) The future must matter enough to outweigh the immediate benefits to any individual of failing to co-operate.
- 2) There must be sufficient assurance that others will co-operate as well.

The first requirement for meeting the conditions is that co-operative actors have to have a credible “retaliatory” strategy that would penalise non-co-operative actors (free-riders) sufficiently in the future and guarantee that most will co-operate (Seabright 1993). Ostrom (1990) listed three problems inherent in implementing such a strategy. First, there is the problem of supplying an institution that would enforce the “retaliatory” strategy. As Bates (1988) argued, supplying an enforcing institution will constitute a new collective dilemma. This second-order dilemma will lead to failure in terms of supplying the institution, given the same incentives not to co-operate (free ride) that constituted the collective dilemma that the institution was supposed to resolve.

In Ostrom’s (1990) words, “[a] second puzzle to be solved in explaining how a set of principals can organize themselves to obtain long-term collective benefits is the problem of commitment”. Although during the initial time period an actor calculating his or her estimated future benefits may agree to follow a proposed set of rules, if most of the others follow the rules, the same actor may later find that the immediate return for breaking them is high enough to act accordingly. Further, solving the commitment problem would be pointless unless there were a mechanism to check whether the actors would actually follow the accepted rules. This third problem of monitoring constitutes the same kind of second-order free-rider as the first problem of supply (Elster

1989). Why would rational actors put effort into establishing monitoring and enforcement institutions that would guarantee the commitment of other actors, if it is difficult at present to recognise the long-term benefits that would outweigh the immediate returns?

There are two frequently cited theoretical solutions to the problems of supply, commitment and monitoring. The first assumes that “because of the tragedy of commons, environmental problems cannot be solved through co-operation...and the rationale for government with major coercive power is overwhelming” (Ophuls 1973). By way of contrast, according to the second policy prescription, “The only way to avoid the tragedy of commons in natural resources is to end the common-property system by creating a system of private property rights” (Smith 1981).

The discussion in this article supports Ostrom’s view that neither of these two alternatives is the “only way”. Both are based on the assumption that in order to find a solution we need to have an external actor or a “third party” (Bates 1988, Ostrom 1990), since the users themselves are unwilling or unable to control resource use. Nevertheless, as the case studies have suggested, this assumption is often confounded by the reality in at least two ways.

First, as we have argued throughout this article, in most cases dispute situations do not follow the logic of the prisoner’s-dilemma type “tragedy of the commons”. Users of a natural resource are usually at least willing to consider agreeing to impose limits on their own activity, if given the opportunity, so as to guarantee sustainable and socially acceptable use. In other words, they follow the strategy of the assurance game, but are faced with the various problems (namely knowledge, distribution, frame and assurance) that prevent co-operation.

Secondly, intervention by an external actor can be costly and have harmful effects on management practices on the local level. Top-down supervision from a distance by authorities utilising old-fashioned punishments and incentives can be quite an expensive, and not necessarily efficient, way to manage local resources (Ostrom et al. 1994, Hanna et. al. 1996). As the case of lake fishery in Finland showed, users on the local level may be crucial in terms of monitoring

resource use and their vital role should be taken into account in assessing the costs of any changes in the management system. Seabright (1993) also demonstrates how an attempt to enforce a private-property-rights system may lead to a breakdown in the existing co-operative mechanisms that have “evolved among those who shared implicit, non-contractual rights in the common property resource”. He also notes that the actual transaction costs (i.e. specifying and enforcing rights) are not taken into account in many cases of privatisation.

However, it has also become evident that, even though the local users might have sufficient means of controlling their natural-resource use, there may still be some disputes over resource management that cannot be resolved by the users themselves. If there is no mutual trust between multiple users, it is hard to see how it is possible to reach a joint agreement that would guarantee co-operation and solve the above-mentioned problems of supply, commitment and monitoring. Still, as Seabright (1993) has noted, there is a full spectrum of solutions. “At the one end of the spectrum is the practice of delegating managerial responsibility to an agent charged with managing the asset on behalf of others; at the other, full participatory decision-making.” More specific consideration of various management practices

and styles will shed light on the solutions that are available in any particular dispute situation.

6.2 Different Sub-Processes for Solving Distributive and Assurance Problems

If we take our game-theoretical distinction between the prisoner’s dilemma or deadlock and the assurance game as a starting point, we can distinguish between two different conflict-management strategies or frames (Table 3). As the table shows, this analysis would suggest that in the prisoner’s-dilemma/deadlock situation, solving supply, commitment and monitoring problems requires an intervention by a third party imposing sufficient enforcement, whereas in the assurance-game situation joint co-operative solutions are at least possible, as long as sufficient assurance exists.

The cases introduced above would suggest, however, that the picture is not so simple. As the Lake Päijänne case showed with its six elements of conflict management, a successful process comprises many sub-processes, “each with its own function for interacting parties, its own internal logics, and its own identifiable set of instrumental acts or tactics” (Walton and McKersie 1965).

Walton and McKersie (1965) distinguished four

Table 3. Differences in conflict-management frames between models of social dilemmas.

	Assurance game	Prisoner’s dilemma	Deadlock
Preference order	1. CC (Universal co-operation) 2. DC (Unilateral free-riding when others co-operate) 3. DD (Universal free-riding) 4. CD (Unilateral co-operation)	1. DC 2. CC 3. DD 4. CD	DC DD CC CD
Problem of co-operation	No assurance that others will co-operate.	Co-operation is not profitable.	
Solution	Sufficient assurance	Incentives and sanctions	
Conflict-management frame	Co-operation and joint co-operative solutions are at least possible when sufficient assurance exists.	Need for an external and coercive power to enforce co-operation by using incentives and sanctions, imposing compensation.	

sub-processes. The first of these is *distributive bargaining*, and its function is to resolve pure conflicts of interest. The point of departure is a fixed-sum payoff, like a fixed area of grazing land in the tragedy of the commons. Consequently, the prisoner's dilemma is a game-theoretical presentation of one possible situation. In the bargaining process each party attempts to maximise its own share of the total payoffs. The game is zero-sum, since what one party gains the other will lose. If the gains and losses can be given numerical values (e.g., monetary), then it may be possible to determine the parties' target (most-preferred outcome) and resistance (bottom line) points, which outline a possible settlement range. Distributive bargaining can thus be described as a process in which parties following their bargaining strategies make offers and concessions in order to reach resolution that would fall within the settlement range. During the process their judgements about their own losses and gains do not remain static, but rather vary as they continually adjust their concession rates with respect to their opponents' concessions (Lewicki et al. 1992).

Economic interests lie at the heart of many disputes concerning the use of natural resources, thus making the distributive bargaining an essential part of almost any management process. Game theory and economics boasts a great variety of models of bargaining and negotiation (Nash 1950, Luce and Raiffa 1957, Walton and McKersie 1965), which are helpful in analysing the distributive fairness of the outcome range. As the Päijänne case showed, providing comprehensive analyses of the economic effects (gains and losses) of possible outcomes can enhance the success of distributive bargaining.

Yet, merely providing information does not guarantee any solution to (re)distributive problems if such a solution is likely to include clear benefits to one group and costs to another. In such cases it is important to devise a sufficient and credible compensation strategy (as well as an enforcement strategy). To be credible, this strategy has to have a solution to problems of supply, commitment and monitoring. For instance, full compensation by the State for the incurred economic losses has been the primary solution to the distribution problem that has arisen in establishing conservation areas on private land in Finland.

Since the benefits of conservation are reaped by society at large, it has been considered necessary for the costs to reflect that.

Despite pressing need to address economic issues, it is important not to assume that the economic argument is the main source of dispute in all cases. In the highly controversial issue of protecting shorelines on private land in Finland, for example, Nieminen (1994) discovered that, while the assumption that the dispute was about economic issues was common among the environmental administration, for the majority of the landowners this was not the case. Instead, what upset many of them the most was the prospect of losing ownership of the land. They were also provoked by the way in which the authorities had treated them during the process. Similar results have been obtained recently concerning forest protection on private land. One fifth of the forest owners surveyed were supportive of voluntary forest protection provided the land remained in their ownership (Horne et al. 2004).

Hence, as the Lake Päijänne case suggests, framing the dispute as a zero-sum distribution problem often restricts the solution options, and in some cases even prevents resolution. Here multi-criteria decision analysis facilitated the framing of the problem in a way that made it possible to negotiate a regulation practice that would distribute benefits and costs more evenly. This negotiation process resembles Walton and McKersie's (1965) second *integrative* sub-process, the function of which is "to find common or complementary interests and solve problems of confronting both parties." The problems that are the subject matter of integrative bargaining are situations in which the total payoff varies, as in watercourse regulation, even though both parties do not share equally in the joint gain, and one may suffer minor inconveniences in order to provide others with substantial gains. The idea is to find solutions that "allow significantly larger joint payoffs than other outcomes do" (Walton and McKersie 1965).

For an integrative process to function, several conditions that are similar to those in the assurance game – namely motivation, relevant knowledge and trust – must prevail. All parties need to be assured "that if they freely and openly acknowledge their problems, if they willingly explore any

solution proposed, and if they candidly discuss their own preferences, this information will not somehow be used against them” (ibid.).

The dynamics of distributive bargaining may complicate the problem of establishing the trust that is necessary for an integrative process to work. First, “it may turn out that particular high joint-gain solutions inherently provide one party with a disproportionate share of the total value” (ibid.). This could be overcome by means of compensations, but sometimes providing the mechanism raises further difficulties. For instance, the disadvantaged party “may not have the distributive power or skill necessary to compel a side payment at the time it comes appropriate” (ibid.). Secondly, actors involved in a mixed-strategy are faced with uncertainty about the strategy of the other parties and it is even more difficult if the process requires a shift from an integrative orientation to the distributive bargaining of shares.

Building up the necessary assurance or trust, in other words solving the assurance problem, is highly dependent on a third sub-process called *attitudinal structuring*, which functions “to influence the attitudes of the participants toward each other and to affect the basic bonds which relate the two parties they represent” (ibid.). Any solution that avoids the mutual destruction of a deadlock situation needs a minimum level of understanding and trust between the actors. Thus proceeding from a conflict situation even to distributive bargaining requires moving from the preference order of deadlock at least to the prisoner’s dilemma (see Fig. 4). In the end, a solution that would solve the problems of supply, commitment and monitoring in the use of natural resources, will probably require an attitudinal shift to the preference structure of the assurance game.

Consequently, mixed processes comprise an inherent dilemma: the integrative process involves open communication, whereas distributive bargaining involves controlled information processes (e.g., the concealing of information to make one’s tactical commitment more credible). The role of a third party could thus be vital in organising the process in a way that facilitates integrative negotiation to emerge regardless of divergent distributional interests. In this it is essential to allow the negotiators to offer the necessary assurance about the current nature of the process (ibid.). In

other words, the process design has a considerable effect on the behaviour of the actors and on the development of trust. Gillroy’s (2000) “politics of assurance” refers to a design that enhances co-operation and mutual trust by creating fair and equal rules of participation in the process and in decision-making. As in the Päijänne case, the setting up of working groups or subcommittees that allow for the exchange of information and open and confidential discussion is one way to proceed. The case of Metsähallitus, in contrast, illustrates how an inappropriate process design (caused by inaccurate policy frames), in which one party in the conflict acts as a third party and a unanimous decision-maker, results in persistent lack of assurance.

Finally, there is a fourth sub-process, the importance of which became evident particularly in the cases of Metsähallitus and Malla. Walton and McKersie (1965) called it *intraorganisational bargaining*, and the idea is to achieve consensus within each of the interacting groups. As we have found, integrative processes are often impeded by intraorganisational pressures (characterised by the institutional frame) that require the organisation (or its representative) to act in a specific way. Members of the organisation may not tolerate off-the-record discussions, subcommittees, or any other tactics that an integrative process demands.

As noted above, organising a conflict-management process that would ease the problems connected with the often contradictory functions and logics of the four sub-processes requires some facilitating third party. How and when such an intervention occurs will have a major significance to how facilitative it is. These questions of style and timing are discussed below.

6.3 Third-Party Solutions and the Challenging Role of the Public Manager

In as far as offering an external third party does not explicitly address the problem of supply, i.e. it does not give straight answer in terms of what motivates the third party or external enforcer to monitor behaviour and impose sanctions, it is a “sleight-of-hand solution” (Bates 1988, Ostrom 1990). This line of argument is critical of the

idea that a third party, be it a mediator or a public manager, should be a neutral actor who has no influence on the preferences of the other actors (Burton 1990). Reich (1990) referred to this as an *interest group intermediating* vision of how a public manager should decide what to do: his or her job is “to accommodate – to the extent possible – the varying demands placed on government by competing groups.” He or she is like referee who is “accessible to all organised interests while making no independent judgement of the merit of their claims.”

This intermediation vision could be combined with another vision that Reich calls *maximising net benefit*. It is assumed that there is a commonly shared understanding of the “public good” that the public manager can reach, although more often than not this is not the case. As noted above in the context of frames, people’s conceptions of the maximum public good may differ considerably (Beierle and Cayford 2002).

Moreover, as the Metsähallitus case clearly demonstrates, a public manager’s motives may play a crucial and active role in the dispute. As we have attempted to show by using the notion of frames, actors’ preferences or interests do not arise outside of and apart from their social context, but are influenced by both the process and the substance of managing. Reich (1990) also argues that in seeking to discover what people want, and responding accordingly, the public manager inevitably shapes the preferences of the other parties.

Nevertheless, even though the neutrality of a third party or a public manager will always remain an illusion that one should regard with suspicion, there are some real differences between the parties in conflict and those who intervene in order to assist in the resolution (Tidwell 1998). One major source of unsuccessful resolution in the conflict between state forestry and reindeer herding in Inari is obviously lying in the dual role of Metsähallitus. On the one hand, Metsähallitus considers itself a public manager, whose role is to intermediate between the competing interests of land user, while on the other hand it is a major land user itself. It is thus hampered in terms of acting as a reliable third party in the conflict since the reindeer herders consider it a party to it. It is thus necessary for a third party to be as neutral as

possible to the outcome and behaviour of the parties within a given range of acceptability, which in turn is defined by the institutional values and expectations of its role (as well as by its own values). A different historical relationship with the parties and diverse institutional affiliations are characteristics that are considered helpful in attaining this “quasi-neutrality” (Tidwell 1998).

Referring to the role and styles of the third party, conflict-management theorists suggest that dispute resolution has at least two stages: a *process stage* comprising the procedures used by the disputing parties, and a *decision stage* in which facts are evaluated and the outcome determined (Lewicki et al. 1992). Thibaut and Walker (1975) distinguished several different third-party styles based on the degree of control in each stage. These styles range from bargaining (no third-party control) via mediation (high process control/low outcome control) and arbitration (low process control/high outcome control) to autocracy (complete process and decision control). Sheppard (1984) further refined this model by adding two more stages: *definition* of the dispute (i.e. what we have called the policy frame) and the selection of the resolution procedure (i.e. the conflict-management frame); *discussion*, in which relevant information and arguments are presented and clarified; *alternative selection* with regard to the solution; and *reconciliation*, in which the parties are reconciled with the solution, the decisions are enforced and appeals heard. He also included in his process and decision controls the motivational control that is used by the third party “to induce desired behavior on the part of the disputants or other involved parties.” Threats, persuasive arguments, direct incentives and legitimate authority are forms of motivational control.

This refined framework allowed Sheppard to distinguish more specifically various styles and timings of third-party interventions. For instance, a fact-finding procedure in which the third party only controls the definition stage could be the most appropriate for resolving knowledge problems. This would involve a third-party committee of investigators, the members of which are recommended by the parties to the dispute, jointly search for evidence and attempt to agree on the facts of the case (Sheppard 1984). Likewise, the “defining characteristic of mediation is that in

Table 4. Conflict-management styles of the third party and the public manager in dispute situations.

Dispute situation	Assurance game	Prisoner's dilemma or deadlock
Conflict-management strategy		
Process can be	Integrative negotiation	Distributive bargaining
The style of the third-party intervention	Facilitating the process (i.e. process control): mediation, fact-finding	An external coercive power to enforce outcome (i.e. outcome control): arbitration
The role of the public manager	To enhance the mutual trust between the participators when at least some management of the natural resource can be coordinated in co-operation with its users.	To work as an external and coercive power by enforcing co-operation in order to produce an outcome.

mediation the intervening party cannot make a decision binding the disputing parties" (ibid.). Thus, mediation would not include control over the reconciliation stage, in other words it cannot produce enforceable decisions. It follows from our analysis of conflict situations presented in this article, that a mediation procedure has to be geared to re-establishing assurance between actors in order to offer solutions that are enforceable by them. If there is still a prisoner's dilemma and lacking assurance, an additional external party will be needed to enforce the decisions. This, in turn, would suggest that in such a situation (e.g. a process largely comprising distributional issues) an alternative intervention procedure such as legal proceedings or arbitration, which restricts the control to the outcome or reconciliation stage, should be available. Further, as in the case of Päijänne, having an alternative intervention could constitute the "retaliatory" strategy needed to commit the parties in a mediated resolution process.

Table 4 shows the conflict-management styles available for the third party and the public manager in dispute situations that follow the preference structure of corresponding social dilemmas (i.e. the assurance game or the prisoner's dilemma/deadlock). Here the roles of the third party and the public manager are divided, whereas in our cases, they were mostly the same, which caused problems given the mistrust of the resource users in the public administration. Therefore in most cases

our analyses would suggest dividing these roles, or at least educating public managers in conflict management. So far Finland lacks the means to offer specialised training related to resolving conflicts in the management of natural resources. There is a clear need for such (Hellström 2006). Turtiainen (1997) also proposed the establishment of an office for the state mediation of forest disputes.

Sheppard's framework also allowed for the differentiation of third-party motivations for intervention (Sheppard 1994). To the commonly cited interest in effective dispute resolution, he added efficiency (conserving time and resources), disputant satisfaction and perceived fairness, each of which could be associated with either the process or the outcome. As noted above, rationalising between competing definitions of outcome fairness (e.g., fair economic-redistribution effects) could be critical in many intervention attempts. Sheppard suggested as a solution to this dilemma that third parties should rather focus on the fairness of the procedure, which is, after all, more under their control.

One crucial aspect with regard to procedural fairness suggested in our case studies is the position of minorities or remote localities. The equal treatment of every participating party could inevitably lead to discrimination against weaker or less educated partners in negotiating processes. For example, if Sámi reindeer herders or local fisher-

men were taken only as equal negotiating partners alongside the pertinent state authorities, agencies or large enterprises, for instance, it would inherently favour existing power structures, and could easily lead to an undemocratic outcome. In such cases, the authorities could decide the final outcome beforehand and merely add the participatory negotiating process as a new act in 'the theatre of democracy' (Banton 1994, Kortteinen and Makkonen 2000). In many cases, the equal right to participate in the decision-making process should involve some form of positive discrimination (also known as 'affirmative action' or 'positive action') to favour disadvantaged individuals, groups or less educated partners. In this connection, Forester (1989) emphasised that fair and just treatment of all groups and individuals in a planning process does not necessarily mean that they must all be treated in the *same* way.

7 Conclusions: Elements of a Successful Conflict Management Process

We have used various game-theoretical models of social dilemmas to characterise different strategies of actors engaged in natural-resource management. We have argued that "the tragedy of the commons" is not a typical resource-use situation, and that models have to be modified to include more than just the one-shot prisoner's dilemma it characterises. Moreover, problems involving complex and uncertain knowledge and differences in interpretation frames (of knowledge, the dispute situation itself, and the conflict-management strategy) complicate the situation more than a pure game-theoretical model can ever capture. Even the analysis of distributional disputes, and of how and why the trust that is essential for co-operation in resource management has emerged or disappeared, requires an understanding of the whole existing structure of the relevant social and institutional settings.

In this article, we have provided a framework for the synthesis of possible theoretical models characterising disputes and their management strategies, and have used case studies from Finland by way of illustration. Our discussion and

conclusions are preliminary, since the framework should be more rigorously evaluated in each case study. Thus, it is not our intention to offer any conclusions or lessons to be learned that could be directly generalised. Below, we rather list five elements that appear to be important in conflict management processes according to our theoretical discussion and the case studies.

1) *There has to be a credible alternative option for co-operation that affects the actors' payoff assessments.*

In game-theoretical terms, there was in the Lake Päijänne case a credible "retaliatory" option that would "hurt" the non-co-operators sufficiently in the future (i.e. that would outweigh the immediate benefits of non-co-operation). This suggests that the amendments made to Finland's Water Act in 1994 with regard to the revision of old regulations supported co-operation between stakeholders. This is a very significant improvement and a dramatic change compared with former practices, because the Water Court process was earlier seen as the only option to resolve conflicts caused by water regulation and construction work. These legal proceedings were time-consuming and expensive, and often exacerbated existing conflicts, while the outcomes of the judicial processes often came as a surprise to all participants.

The full significance of this element becomes obvious if water regulation is compared with forestry planning. Metsähallitus, for instance, has been a pioneer in developing a proactive conflict-management strategy through participatory planning. In this case, too, the initiative was voluntary, and the processes have exceeded the requirements of the legislation with respect to public involvement. However, the fundamental difference lies in the situation in which co-operative, participatory processes were initiated. In the case of water regulation, alternative co-operative approaches were developed to avoid lengthy and unsatisfactory court processes, which resembles the idea of the so-called Alternative Dispute Resolution (ADR) framework applied particularly in the United States (see Carpenter and Kennedy 1988, Lewicki et al. 1992, Walker and Daniels 1997). In contrast, there was no such a feedback mechanism in the Metsähallitus case, as forestry

planning decisions are not open to appeal. This difference is highly relevant, since knowing that failed negotiations will lead to court proceedings pushes the parties, including those with the most power, to succeed in negotiating an agreement. In other words, the parties' best alternative to a negotiated agreement (BATNA) in the case of water regulation is unattractive enough to encourage them to seek agreement, while it is asymmetric for parties in the forestry-planning case: should Metsähallitus choose not to seek consensus for some reason, the dissatisfied parties are left with fewer alternatives than if there is an appeal process.

- 2) *The management process has to include sub-processes in which mutual trust between the actors (including a public manager or a third party) can emerge.*

As argued earlier, actors are conditional co-operators in the assurance game. In other words, to co-operate they must be sufficiently assured that others will co-operate as well. Thus, in the context of the assurance problem, in which the sustainability of co-operation is a marginal matter, the presence or absence of this assurance or trust will affect the extent to which co-operation succeeds (Seabright 1993).

In order to generate the necessary assurance in the Lake Päijänne case, special emphasis was placed on public involvement and the openness of the planning process. As also noted in the Malla case, one crucial aspect of this planning process was the face-to-face relations. Warren (1999) argues that the reason for this is, "Because mutual respect and tact are more likely in face-to-face relations, narratives are more likely to focus upon self-characterization and to do so in ways that function as assurances, focusing not simply on differences, but also on shared commonalities and predicaments."

Thus, face-to-face deliberation in planning processes may challenge the narratives (or characterisation frames) that demonise opponents by producing alternatives that provide assurance. Furthermore, Warren (1999) argues that the public character of planning processes enables them to provide a sort of "display of public reasons or reasoning" that may help to "break vicious cycles of trust, betrayal, and cynicism in favour of a more

benign and progressive principled opposition of arguments." Warren also notes that people are more likely to tolerate principled disagreements than betrayals of trust. Thus deliberation based on public argumentation could develop reasoning that would "justify compromised interests and identities."

According to Laird, deliberative participation also "makes people more aware of the linkages between public and private interests, helps them develop a sense of justice, and is a critical part of the process of developing a sense of community," (Laird 1993, in Beierle and Cayford 2002). It is suggested in the literature on collective dilemmas that establishing a sense of community is an essential mechanism for solving the problem of the supply of a new management institution (see Section 6.1 above, i.e. to avoid the second-order collective dilemma in terms of supplying the new institution in order to resolve the first-order dilemma) (Bates 1988, Ostrom 1990).

Mixed processes incorporating strong economic interests and distributional problems, may severely hinder the emergence of a co-operative process and the role of a third party could be vital in enabling co-operative (integrative) discussion to emerge regardless of conflicting distributional interests. In this it is essential to allow the actors necessary assurance about the current character of the process. As in the case of Lake Päijänne, one possibility is to use working groups or subcommittees in which information can be exchanged and that promote open and confidential discussion.

If working groups are used, however, it is crucial to address issues of power relationships. Powerful actors may interfere with the working of the groups or in the process of reaching co-operative and fair solutions regardless of the availability of the alternative "retaliatory" option. As Tidwell (1998) notes, even with the best intentions, mediation may be used as a method for maintaining control by the powerful over the weak in that conflicts may be hidden and procedural fairness denied. Thus, a strong third party, particularly when it is a public manager or a state authority, must carefully analyse the dispute at hand. As the case studies show, an inaccurate policy frame and the resulting conflict-management frame in a public manager may indeed lead to the escalation of a dispute and

not to resolution: successful conflict management depends not only on accuracy in terms of frames, but also on a credible institutional framework that would (re-)establish the necessary trust in the dispute-resolution process. What is essential here is to establish explicit and reliable roles for the third party and management authority.

3) *Questions concerning the third party and the managing authority need to be addressed in terms of giving them explicit roles and a clear division of commitment and entitlement.*

It is critical in successful conflict management that any third party is considered trustworthy by the disputing parties. In the conflict involving State forestry and reindeer herding in Inari, for example, reindeer herders consider Metsähallitus one of the disputing parties and thus not a reliable third party. From their perspective, the resolution process is unacceptable as long as one of the disputing parties is making decisions unilaterally.

Furthermore, as our cases show, in a multiple-use situation, not all users necessarily possess the authority to act on the basis of the knowledge they have. The use of reindeer pastures by other land users, for example, is regulated by Metsähallitus, as well as by municipal or regional zoning – all processes in which the herders have no formal voice. Thus, even if all of those concerned could agree that a pasture was being overused, and that something should be done, they would have limited means to act. So far, reindeer herders have been virtually excluded from other than internal options – such as beginning winter-feeding, reducing the numbers of reindeer and herders, building fences, replacing workers with machines, beginning capital intensive-farming, and getting a second job.

Unclear and shifting roles of a third party and a managing authority noticeably undermine the credibility of efforts to establish an institutional framework for conflict management and sustainable resource use. It is thus vital that the roles and the corresponding commitments and entitlements required by the managing system – be it based on the managing authority of a public manager or a community of users – are explicitly defined during the conflict-management process accepted by all parties. This does not necessarily mean that the

public manager has to give up his or her formal decision-making power – a point often raised by administrators. The dispute-resolution process may be informal, and bind the public manager or the administrator only morally. Thus it is possible to achieve the goal of maintaining legal authority at the same time as reaching a commonly acceptable solution (Susskind and Cruickshank 1987, Carpenter and Kennedy 1988).

Moreover, all the different levels of administration and decision-making that affect the process and substance show to be present in the solution-seeking process. This should not be seen as an either-or issue in terms of the level of hierarchy on which the decision should be made, but should be perceived as a both-and matter. For example, regardless of the degree of trust and co-operation, local stakeholders are incapable of resolving disputes that are caused by regulation on the higher levels of the hierarchy. Similarly, top-down decisions may be ineffective if their implementation is blocked by protests on the local level. Co-management thus requires the involvement of all relevant levels of the hierarchy in the process and in the decision-making. Herein lies its greatest promise, based as it is on multiple layers of nested enterprises, but also its toughest challenge, as the case of lake fisheries has shown.

4) *The management process has to take account of the frame differences between the actors (including the public manager) and inside their organisations. The process designer (or a third party) has to address these frame problems so as to enable a learning process to emerge. Comprehensive analysis of resource use (i.e. addressing knowledge problems) and actor preferences could have a crucial role in decreasing the negative impact of frame differences in the management of multiple resources.*

According to Schön and Rein (1994) one way of overcoming frame differences in policy controversies is to introduce a “situated, frame reflective policy practice” in the course of which conversation parties “must be able to put themselves in the shoes of other actors in the environment, and they must have complementary ability to consider how their own action frames may con-

tribute to the problematic situations in which they find themselves.” At best, such reflection could mean a learning process (Leskinen 1994, Webler et al. 1995) through which parties reframe their identity and characterisation frames, and which makes cooperation possible even when there might remain unresolved controversies in underlying values.

As in the Päijänne case, many related sub-projects produced plenty of new information on the social, ecological and economic effects of regulation. The decision-analysis approach was applied in order to manage the whole complex problem, and to gauge the preferences of the various stakeholders. These elements together improved communication and trust between the stakeholders and advanced their abilities to put themselves in other stakeholders’ shoes. The interviews were a crucial element in this learning process in that they improved both the overall understanding of this complex problem and the communication, and also facilitated the articulation and analysis of respective values. Moreover, the decision analysis clarified the differences between the stakeholders’ values and their importance in the comparison of alternatives.

Comprehensive assessment of the regulation also enabled us to find a regulation practice that would reduce the harmful effects on the water ecosystem and recreational use and still serve the original objectives of the regulation. In this sense it facilitated the reframing of the policy situation from that of a zero-sum game to an integrative process through which a complementary and common solution could be found.

- 5) *The conflict-management process should be taken as an essential aspect of ongoing co-management practices, not as a distinct phase of conflict resolution.*

We have analysed interconnections between two distinct management practices. On the one hand we considered the problems characterised by “the tragedy of the commons” in managing resource use on a sustainable level, and on the other we focused on policy disputes and conflicts concerning the sustainable management of natural resources.

Management problems connected with the

resource use may be pure coordination problems caused by limited knowledge about the resource itself or about the behaviour of other users. What our case studies show, however, is that in most cases these coordination problems are deeply interconnected with conflicting frames, i.e. underlying structures of beliefs, perception and appreciation held by the multiple users of the resource. Thus, most of them are not resolvable purely by organising better inter-user coordination: the starting point should be a conflict resolution process of some kind.

At the same time, it seems to be established from the cases of the multiple use of natural resources that a distinct conflict-resolution process that does not address the problems of supplying a credible resource-management institution (with reliable monitoring guaranteeing sufficient commitment) will most probably not provide an enduring solution. It would rather seem evident that fair institutional resource-management practices that cope with disagreements and policy controversies between users (and also possibly the public manager), are most likely to ensure sustainable management of both the resource and the conflicts concerning its use. As we have argued, essential to such an institutional setting are symmetric alternative options to the negotiated agreement (BATNA, e.g., a chance to appeal), and sub-processes in which knowledge gaps and frame differences can be deliberately negotiated. Finally, it must be emphasised that public managers should be openly aware of their challenged role, particularly when they are at risk of being considered a disputing party by the other parties. In our cases, the roles of the third party and the public manager were mostly the same, which caused some problems due the mistrust the resource users had of public administration. Most of our case analyses would suggest dividing these roles, or at least educating public managers in facilitating conflict-management processes. As Finland lacks specialised training related to conflict management in natural-resource issues, this is a clear developmental need.

Above we have identified five elements that appear from our analysis to be vital in the management of conflict as a means to securing the sustainable use of natural resources. Although we emphasised the need for fair institutional settings

that allow co-operation between the parties to emerge, it is also worth reminding the reader that the absence of disagreement and conflict could also be a problem from the democratic perspective. As we argued, it is disagreement on some level rather than agreement that characterises the normal state of a democratic society. Thus the aim of conflict-management processes should not be to eliminate disputes or conflicts.

Similarly, there is wide agreement among scientists and practitioners that public participation should not focus too much on dispute resolution and consensus finding (e.g. Coglianese 1999, McDaniels et al. 1999). As was evident in our case studies, one reason for this may be that many policy conflicts are so complex and permanent that there is no final solution. Furthermore, there may be institutional and structural dynamics (e.g., institutional agreements, interorganizational relations) that make it difficult to solve the problems (Waage 2003). In these situations, productive dispute might be the most preferred option: the parties could use non-co-operative strategies but without incurring the destructive derivatives of escalated conflict (see also Lewicki et al. 1992). At best, research into conflict management could offer productive strategies by analysing the conditions of these situations. We have done our best to provide some theoretical tools and practical case studies in order to facilitate further research and discussion.

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