



**CONFRONTATION OR COMPROMISE?
DETERMINING APPROPRIATE INSTITUTIONS
FOR ENVIRONMENTAL CONFLICT RESOLUTION**
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ABSTRACT

In this paper we discuss adversarial and cooperative institutions for conflict resolution and, based on the notion of the production possibility frontier, we analyse cases in which these different institutions are appropriate for resolving conflicts between timber production and environmental interests. It is found to be important when choosing between the institutions to consider natural conditions, such as how sensitive the environmental goods are to changes in timber production. For a party involved in a conflict, the preferences concerning the institutions are to a great extent governed by the attitudes towards risk and the probability of recurring conflicts.

Keywords: Adversarial institution, cooperative institution, conflict resolution, forest, environmental good, timber, production possibility frontier.



INTRODUCTION

There are different kinds of institutions for conflict resolution. The kind of institution that tends to be most prevalent in a particular democratic society depends, to a large extent, on historical factors, such as how democracy itself has evolved in that society. Institutions for conflict resolution have important impacts on policy outcomes and are, therefore, of interest for economic analysis.

In the following, we shall distinguish between two broad categories of institutions: adversarial and cooperative. The characteristics of these categories are discussed extensively in Kelman (1981 and 1992). In an adversarial institution the two (or more) opposing parties in a conflict present their cases to a neutral party, who then makes the decision. The neutral party may be a single person, but in a democracy it is most often a group of persons, such as a jury. A typical

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neutral party in an adversarial institution is a court of law, but it can also be some other type of decision making body, usually governmental. An important characteristic of an adversarial institution is that the outcome of the conflict tends to be "all or nothing" for a single party, i.e. one party "wins" and the other "loses".

The cooperative institution, in contrast, does not include a neutral party making the decision on how to solve the conflict. Instead, there are various negotiation groups and committees where the opposing parties sit down and reach a decision together. A typical feature of these decisions is that they tend to be compromises, i.e. the interests of each party are satisfied, at least to some extent, or put another way — the single party is both a "winner" and a "loser" (Harrison, 1995).

It is important in this context to remember that a third way of reaching a decision exists, which is also common in democratic societies, namely majority vote. The main arena for this institution is the political law-making process. However, the focus in this paper is on decisions within an existing framework of laws and regulations.

Previous research on institutions for conflict resolution has mainly been from the viewpoint of political science and jurisprudence. However, an institution which is appropriate in these settings is not necessarily appropriate from an economic point of view. Our approach in this paper is mainly economic, but we have also tried to take account of political and legal aspects, since we believe that such a combination of disciplines can enrich the analysis. Adopting this approach, the purpose of this paper is to analyse cases in which adversarial and cooperative institutions, respectively, are appropriate for resolving environmental conflicts relating to forests.

It should be recognized that neither the costs of bargaining in the case of a cooperative institution, nor the costs of a court trial within an adversarial institution, are taken into consideration in this paper (cf. Coase, 1960). In the case of an adversarial institution, Baik & Shogren (1994), using a game theoretical approach, make a thorough analysis of how efforts expended in a conflict depend on the reimbursement schedules. The reason why we do not discuss bargaining and court trial costs is twofold. Firstly, as will be

evident, our focus is not on the strategic behaviour of the conflicting parties. Secondly, it is difficult to make an *a priori* choice between the institutions for conflict resolution on the basis of such costs. This is because their relative magnitudes may vary a great deal between different conflict areas, i.e. in one conflict area bargaining may be "cheaper" than a court trial, whereas in another area the opposite may be the case, and because, in the case of the adversarial institution, the reimbursement rules may vary between countries.

The paper is structured as follows: in the next section we compare Sweden and the United States with regard to institutions for conflict resolution; then we introduce the theoretical framework of the production possibility frontier into the analysis; and the final part contains our concluding remarks.

CONFLICT RESOLUTION IN SWEDEN AND THE UNITED STATES

In Sweden, cooperative institutions form the main framework for resolving conflicts. As noted by Kelman (1981), the reason for this can be ascribed mainly to historical factors. Cooperative institutions were used by the King and the upper classes in the 19th century as an effective instrument to quiet down the demands from the peasantry and the growing working class. This facilitated a peaceful transition from a (more or less) autocratic rule in the beginning of the 19th century to a modern democracy by the beginning of the 20th century (universal suffrage was introduced for men in 1905, and for women in 1921).

Today the politics of compromise is fairly rooted in Swedish tradition, including forest-environmental administration (Eckerberg, 1990). In a comparative study of the methods used by occupational safety and health agencies in Sweden and the United States to make companies comply with regulations (Kelman, 1981), the main instrument used in Sweden was found to be negotiations and advice. Furthermore, the practice of frame-laws in Sweden encourages cooperative conflict resolution. Such laws do not contain details on how different areas of possible disagreement should be resolved. Instead, the frame-laws are used for defining general political goals. There has been a substan-

tial increase in the use of frame-laws in Sweden. This is despite their general unpopularity among lawyers, faced with difficulties in interpreting and applying them.

In the United States, the adversarial trial is a relatively more important framework for resolving conflicts. This has also its historical roots. American society was from the very beginning based on liberal and self-assertive values. These self-assertive ("have it *your way*") values, which still set the tone, make Americans less predisposed to develop cooperative institutions. Adversarial institutions, on the other hand, are more in line with self-assertive values, since they allow each party to "plant its flag" without compromising its goals. Such institutions were early an intricate part of the United States federal regulatory process and later incorporated in the Administrative Procedures Act of 1946.

In Sweden, the practice of cooperative conflict resolution extends to forestry and environmental issues (which tend to coincide to a large extent, since more than 60% of the country is forested). The government agency responsible for forest resources in Sweden is the National Board of Forestry, with its County Forestry Boards (established at the beginning of this century). As shown by Stjernquist (1973), most of the County Forestry Boards followed a lenient policy towards the forest owners already from the beginning, and they still do.

During the seventies the Swedish Forestry Act was widened considerably. A general recommendation saying that the forest owner should pay attention to the environment was developed to a specific paragraph proclaiming environmental consideration in all forestry. Furthermore, a paragraph was introduced forcing the forest owner to report in advance to the County Forestry Board every planned final felling larger than 0.5 hectares (which most of them are) at least one month before the operation was to be undertaken. If the County Forestry Board did not raise any objections, the forest owner could carry out his proposed operation. This paragraph made it possible for the authority to prevent final fellings that were not in accordance with the stated environmental considerations.

From 1980 to 1989 nearly 400 000 planned final fellings were reported in Sweden. Only twenty-one of them were prohibited by the County Forestry Board with reference to

the environmental consideration paragraph. Five of these prohibitions were appealed against by the forest owner to the National Board of Forestry, and only one case proceeded to trial by jury outside the forest sector (Darpö, 1991). It should be noted that neither environmental organisations nor the general public have the right to appeal, should they feel that the felling plan violates the Forestry Act. Furthermore, it should be stressed that the low prohibition rate did not mean a high degree of environmental awareness among forest owners. On the contrary, a study by Eckerberg (1990) indicates that roughly 40% of the final fellings carried out during the period 1980–1985 did not comply with the environmental consideration requirements. Since 1994 a new Forestry Act is in force in Sweden. It is characterized by levelling the environmental goal with the timber production goal and, in common with the old Forestry Act, it includes a paragraph about reporting final fellings in advance. During the 1990s, environmental aspects have increased in Swedish forestry practise, mainly due to an extensive environmental education program among forest owners and logging companies (Eckerberg, 1995). Still, however, roughly 25% of the final fellings do not comply with environmental regulations.

Nevertheless, the conclusion that can be drawn from the figures mentioned above is that even though many Swedish forest owners did not fulfil the environmental requirements, the authority seldom made explicit use of the legislation instrument, and when it did, the forest owners usually accepted the interference from the authority. This reflects both what Eckerberg (1990) calls "the forest sector culture", meaning that timber production was given much higher priority than environmental interests, and what Darpö (1991) calls "the closed system", i.e. the way in which conflicts between timber production and environmental interests are resolved is a matter between the forest owner and the civil servant from the County Forestry Board.

The situation is quite different in the United States, where there is a long tradition of taking into account environmental interests in forest management. The concept of multiple use forestry was established as a guiding managerial principle for the National Forests already in 1905 (Cliff, 1962). However, as mentioned by Gregory (1955) in

a seminal paper on the economics of multiple use forestry, there were difficulties in the application, although the multiple use idea as such was generally accepted at an early stage.

In the United States, the National Environmental Policy Act stipulates (since 1970) that Environmental Impact Statements are required before federal projects significantly affecting environmental quality are implemented. This also applies to forestry, so that forestry operations in National Forests, such as final fellings, must be preceded by plans at the local level. Such a plan, prepared by the Forest Service, is based on an inventory of, among other things, environmental values, and includes a description of the potential environmental consequences of the operation (Eckerberg, 1990). Authorities, organisations and the general public can relatively easy get a deep insight into the plan, and they can appeal against it if it does not seem to be in accordance with environmental requirements etc.

Compared with the Swedish situation, there is a reluctance in the United States to regulate private forestry. However, in some states, such as California, final fellings intended to be carried out must be reported in advance even when they are not on federal land. In addition, a Timber Harvesting Plan is required, describing potential environmental impacts etc. The plan is scrutinized by the authorities and various experts, who often recommend alterations. Also, the plan is publicly announced and, in principle, all who wish may appeal against it, should it be in violation of, for instance, the Endangered Species Act. As shown by Naysnerski & Tietenberg (1992), such legal suits by citizens have become quite common in recent years.

It is evident that in the United States the system for resolving conflicts between timber production and environmental interests is much more "open" than in Sweden. The plans for forestry operations and the potential consequences of them are much more exposed to authorities, organisations and the general public. Trial by jury is used relatively frequently as an instrument for conflict resolution, and there are agencies specialized in pleading the case for environmental interests, etc.

Seen from a principle point of view, both of the approaches to conflict resolution — i.e. the "open" system

congruent with the adversarial institution and the "closed" system congruent with the cooperative institution — have their respective advantages. The main advantage with the adversarial institution is that there are relatively good possibilities for all interest parties — not only the forest owner and the forest authority but also various organisations and the general public — to participate in the process of achieving conflict resolution (cf. Darpo, 1991). In other words, there is a relatively high level of democracy, although consensus is seldom reached.

When it comes to the cooperative institution, consensus is a kind of "ideal state", for which it is worthwhile striving. The main advantage is, thus, that the informal negotiations associated with this institution generally help interests participating in the process to better understand each other. In these negotiations the one interest party may even come to appreciate the perspectives and values of the other party — they become more "public-spirited" (Kelman, 1981). On the other hand, all interest parties are seldom given access to the negotiations.

What is then the most appropriate institution for resolving environmental conflicts relating to forests? As will be demonstrated below, the answer depends very much on the character of the conflict with regard to natural conditions and opposing parties.

PRODUCTION POSSIBILITIES AND APPROPRIATE INSTITUTIONS

The analysis in this section is based on the notion of the production possibility frontier (PPF), which summarizes information about production trade-offs. In this context, the term "production" refers not only to commercial forest goods, such as timber, but also to forest environmental goods, such as recreation environments, biodiversity etc. We will discuss what shapes the PPF of different forest areas might take, and we start out by assuming a conflict between a party representing environmental interests (for instance a non-governmental organisation) and one (or more) forest owner(s). For simplicity, we also assume that the shape of the PPF for the specific forest area is known in advance. The task is then to determine what conflict re-

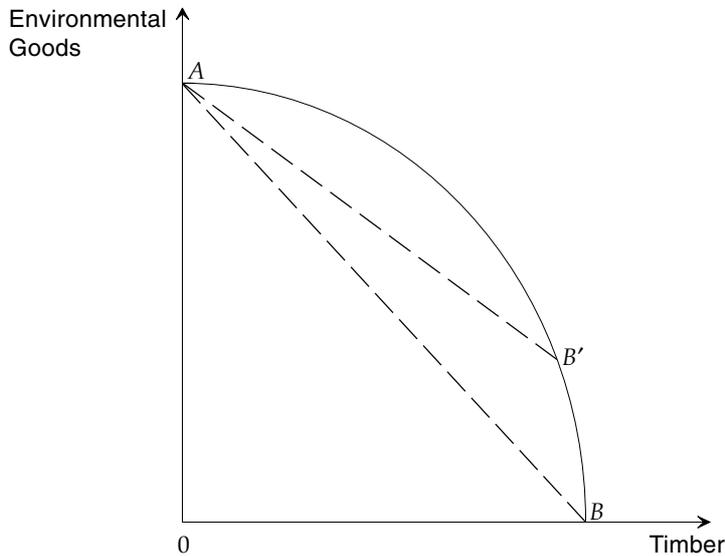


FIGURE 1. STRICTLY CONCAVE PPF

Production possibilities when environmental goods decrease with an increasing marginal rate as timber production is increased.

solving institution should be employed.

The starting point is the normal, strictly concave PPF, as depicted in Figure 1.

When the PPF is strictly concave, environmental goods decrease at an increasing marginal rate as timber production increases. If this is the case, it is easy to show that the cooperative institution is superior to the adversarial one, regardless of what level of timber production (and level of environmental goods) is socially optimal. The reason is that the cooperative resolution will be on the PPF for every forest area, while the result of the adversarial institution will be at A for some areas and B for others, depending on which party is the "winner". The expected resolution from the adversarial institution will then be a weighted average of A and B , with the weighting factor being the *ex ante* probability that either party "wins", which is depicted by the lower, dashed line. The adversarial institution is inferior to the cooperative one, since the dashed line is below the PPF for all interior solutions. This conclusion does not

change if the optimal level of timber production from the forest owners' point of view is less than B , for instance B' .

From economic theory it follows that the PPF is strictly concave for manufactured goods when the technology exhibits decreasing returns to scale and when there are no externalities (Layard & Walters, 1987). However, in reality the PPF is not restricted to the strictly concave shape (see, for instance, Baumol & Oates, 1988). In the context of this paper, the PPF results from externalities created by the timber production (for simplicity, only negative externalities are considered here). Strict concavity may be the case if, for example, environmental goods refer to forest recreation in urban areas. In this case, the externalities are less negative than if, for example, environmental goods refer to biodiversity in wilderness areas. In the latter case, the shape of the PPF is determined by the effects of the externalities on ecological variables in areas sensitive to human intrusion. Despite the fact that commercial forestry has been carried out virtually everywhere in Sweden during the last two centuries, there still exist pristine forests with almost undisturbed ecosystems. If we look globally, the share of this kind of forests is larger. For such forests even a low level of timber production would imply a large decrease in environmental goods (i.e. wilderness biodiversity), but successively higher levels of timber production would imply a decreasing marginal change in environmental goods, since the main damage has already been done. This kind of strictly convex PPF (see Baumol & Oates, 1988, and Pearce, 1990) is illustrated in Figure 2.

The timber production level at B , T' , represents the level which a commercial company would choose if it could ignore environmental goods. It is assumed here that B allows a positive (but arbitrarily small) level of environmental goods, i.e. environmental goods do not become completely eradicated (an assumption that is not necessary for the following argument). A strictly convex PPF implies that the adversarial institution is superior to the cooperative one, since the dashed line, depicting the *ex ante* expected solution set when the adversarial institution is applied, is above the PPF (solid curve) for all interior solutions. In contrast, the solution for the cooperative institution, implying a compromise (and hence a timber production level

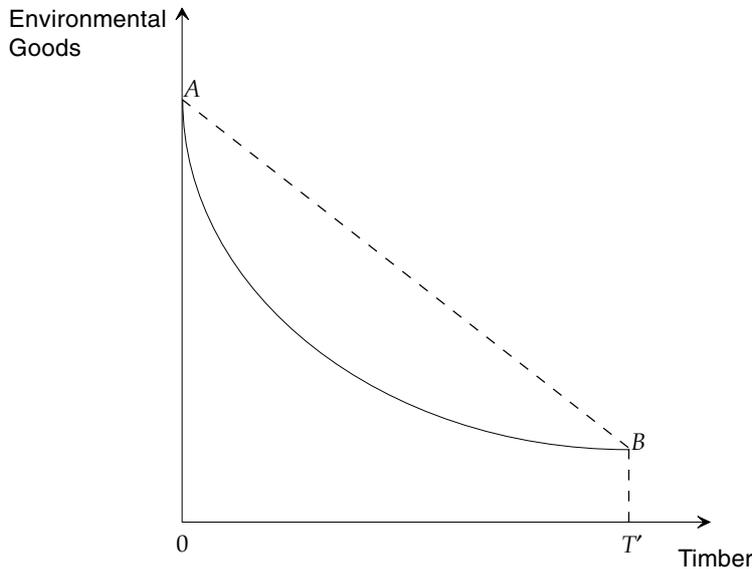


FIGURE 2. STRICTLY CONVEX PPF

Production possibilities when environmental goods decrease with a decreasing marginal rate as timber production is increased.

between zero and T') in every area, must be on the PPF. Intuitively one can argue that the adversarial institution is superior if the PPF is convex, since although some areas are completely exploited (solution B), and thereby almost lost from the viewpoint of the party representing environmental goods (let us call them environmentalists), this is more than outweighed by the fact that other areas are completely saved (solution A). Note that the result is true without any assumption or information about the preferences of the society.

One can note the mathematical similarity between the above results and the utility theoretic results about risk aversity and risk loving found in many microeconomic textbooks (e.g. Layard & Walters, 1987). Mathematically, both results are applications of a theorem known as Jensen's inequality. Theoretically, both the environmentalists and the forest owners should prefer the gamble of a court trial if the PPF is strictly convex. In practice, environmentalists seem to be more comfortable than the forest owners with the adversarial institution. The reason is that, while the environmentalist party often remains the same as new forest areas become disputed, the forest owner is often a new

one and, if he is a small forest owner, a court trial may become a one shot game. If he is also risk averse, he will prefer the cooperative institution rather than a court gamble, since this normally implies that he does not have to risk losing all possibilities of timber production.

Even though the strictly convex PPF depicted in Figure 2 might very well be true for some forest areas, it is probably somewhat of an extreme case. The difficulty in knowing how the PPF is shaped in reality depends on, among other things, limited ecological knowledge. It is realistic to believe that in some cases environmental goods only slowly decrease with small levels of timber production, but increasing levels of timber production could result in a sharp decrease in environmental goods, until they level out at some low level. Evidence that this may be the case can be found in a couple of economic analyses of the preservation of the Northern Spotted Owl in the Pacific Northwest region of the United States (Montgomery *et al.*, 1994, and Montgomery, 1995). Such a relationship between timber production and environmental goods creates a reversed-sigmoid shaped PPF, as illustrated in Figure 3.

Obviously, in this case the solution becomes less clear-cut. For optimal expected timber production levels exceeding T'' , adversarial institutions should be preferred, while cooperative institutions should be preferred below T'' . Apparently, it is necessary to have information on the preferences of the society before one can decide which institution to employ. Figure 3 includes a community indifference curve (CIC) that is tangent to the dashed line, implying that the adversarial institution is appropriate. Figure 4 illustrates a case where the cooperative institution is superior when considering the societal preferences, since the CIC here is tangent to the PPF.

It can be noted that the reversed-sigmoid PPF can be interpreted as a generalized form, which contains both the strictly concave and the strictly convex as extreme cases. The proof is simply that the reversed-sigmoid reduces to the strictly concave as $T'' \rightarrow T'$, and to the strictly convex as $T'' \rightarrow 0$. Loosely, one can then conclude that an adversarial institution is more likely to be appropriate the lower the level of T'' is, i.e. the more sensitive the ecosystem is for human intrusion, and *vice versa*.

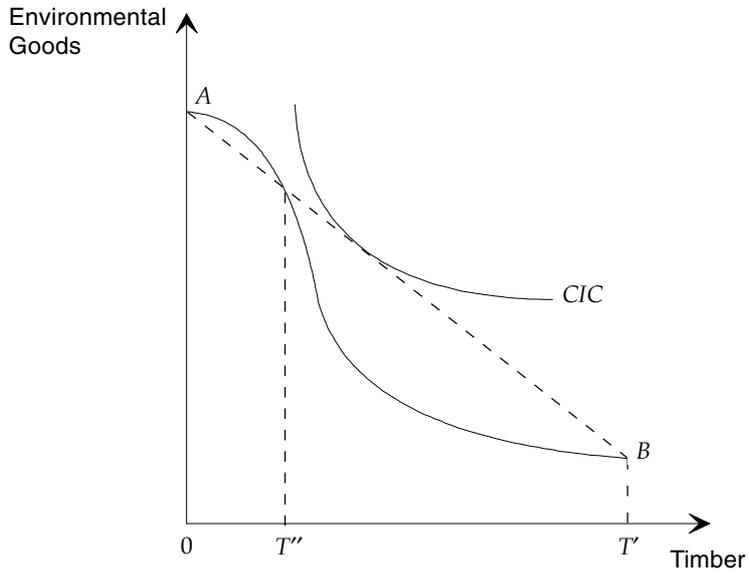


FIGURE 3. REVERSED-SIGMOID PPF

Production possibilities when environmental goods decrease in a reversed-sigmoid fashion as timber production is increased. A case when adversarial institutions are superior.

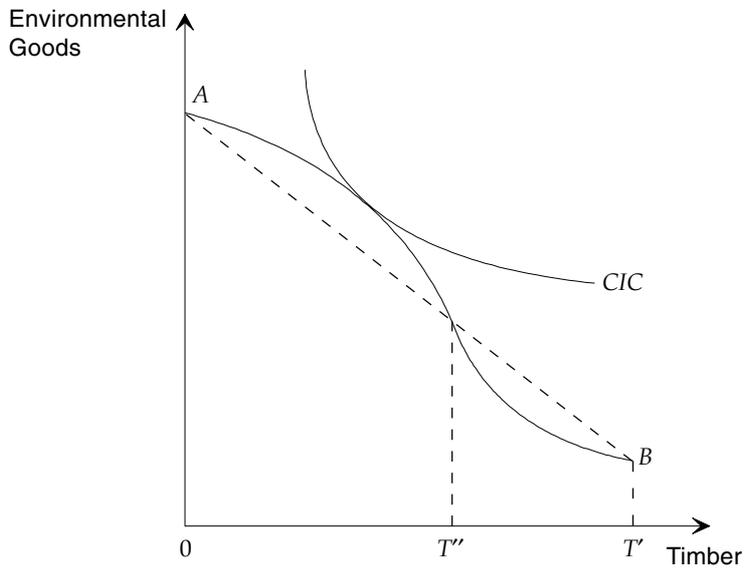


FIGURE 4. REVERSED-SIGMOID PPF

Production possibilities when environmental goods decrease in a reversed-sigmoid fashion as timber production is increased. A case when cooperative institutions are superior.

Accordingly, adversarial institutions tend to increase land use specialisation, i.e. a specific area is devoted to one land use only. Vincent & Binkley (1993) have thoroughly discussed why efficient multiple use forestry may require land use specialisation. Their analysis takes a different tack than the present, however, since they discuss the possible effects of different allocations of management efforts. By allocating management efforts differently between forest stands they arrive at the conclusion that land use specialisation may be optimal even within the framework of a strictly concave PPF. Furthermore, they argue that specialisation at the stand level is more in line with the original application of the term "multiple use forestry" (for instance, as used by Chapman, 1950). However, Vincent & Binkley do not address the question of institutions for conflict resolution or the possibility of non-concavities in the PPF. Their analysis also differs from the present in the sense that they discuss the stand level, while the present analysis is at the forest area level.

CONCLUDING REMARKS

In this paper we have discussed the application of adversarial and cooperative institutions for conflict resolution, and, based on the notion of the production possibility frontier, analysed cases in which these institutions are appropriate for resolving environmental conflicts related to forest land. It was found that when choosing between the institutions, it is important to consider what the natural conditions are and who the opposing parties are. When it comes to natural conditions, the crucial issue is how sensitive the environmental goods are to changes in timber production. The question of opposing parties relates to, among other things, whether the forest owner is large enough to reap both the gains and the losses of the court gamble which the adversarial institution tends to imply.

In an area where the relationship between the timber production interest and the environmental interest should be described by a concave production possibility frontier, it is preferable to strive to adjust the interests to each other and thus to develop a dual land use on the same area, through the application of the cooperative institution. In such an area, land use specialisation congruent with the

adversarial institution is inferior. This inferiority becomes even clearer when considering the fact that the externalities created by timber production are not entirely negative. Positive external effects do also exist, such as when wood truck roads are used by recreationists (Bostedt & Mattsson, 1995) and when moderate fellings improve the landscape scenery (Mattsson & Li, 1994). It is obvious that land use specialisation withdraws the possibilities to utilize such positive external effects. In an area where, in contrast, convexity in the production possibility frontier characterizes the relationship between timber production and the environmental interest, land use specialisation is preferable. This is because in such an area — it may be one where the environmental interest is due to wilderness biodiversity — there are no positive external effects from timber production, but only negative ones, and these are very pronounced. In turn, this makes dual land use inferior, i.e. any combination of the two land uses produces less than land use specialisation.

The analysis was simplified in the sense that a cooperative institution is expected to result in consensus and two (or several) land uses on the same area, whereas an adversarial institution is expected to result not in consensus but in land use specialisation. Reality is, however, more complex. For example, use of cooperative institutions, as in Sweden, does not necessarily exclude land use specialisation. The new forest policy (in force since 1994) is, to a large extent, characterised by continued reliance on cooperation and consensus. However, it also suggests that the areal extent of national parks, i.e. a land use specialisation, should be increased considerably in order to avoid extinction of certain flora and fauna species (which is in line with ideas of zoning, as discussed in, for instance, Alverson *et al.*, 1994). There is no doubt that if such an increase in land use specialisation and the idea of cooperation/consensus are to be successfully combined, considerable economic compensation will need to be paid to land owners. Earlier research has indicated that such compensation reflects priorities among the general public (Kriström, 1990).

Furthermore, efforts to reach consensus by cooperation may exist even when an adversarial institution is applied

at a "higher" level. For example, the Saami people practising reindeer herding in north-western Sweden have, because of conflicts with other interests, striven to attain the right to decide the land use by bringing the issue to court. At the same time, consultation groups, including reindeer herders and representatives of forestry, have worked at a "lower" level to reduce the conflicts within the frame of a dual land use on the same area. Still, *if* the adversarial institution had resulted in land use specialisation and this had been appropriate, i.e. *if* the relationship between reindeer herding and forestry should be described by a strictly convex production possibility frontier, then the efforts of the consultation groups would not have been rational in the sense that the cooperative institution would have been inferior.

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