Natural Resource Management in an Institutional Disorder

The development of adaptive co-management systems of moose in Sweden

Sofia Wennberg DiGasper
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Abstract

The overall aim of this thesis is to contribute to the understanding of the development of adaptive co-management systems and of the role the State plays in promoting or hampering such a development. Natural resource issues are often characterised by conflicting interests and in general implemented by conventional, top-down management systems. Therefore this thesis also investigates the effect conflicting interests and institutional path dependencies have on the development of adaptive co-management systems.

The Swedish moose management system was established in the beginning of the 20th century as the State was trying to rectify a “tragedy of the commons” situation since moose at the time was almost extinct. The administrative system erected can be characterised as a conventional, top-down, single-species management system, and had features of both corporate arrangements and legal-rational bureaucratic administrative models. Due to high administrative costs and the explosion of the moose population in the late 1970’s which resulted in significant grazing damages on commercial tree species, the State changed its policies. One change in formal rules allowed for hunting rights owners to establish so called Moose Management Units (MMU) which entailed that they gained management rights, and thereby could decide on their own the number of moose to be shot in a hunting season. This is a critical right since approximately 1/3 of the moose populations are decimated during a hunting season and this right is therefore an efficient tool for controlling the size of the moose populations. The State also made alterations in the corporate arrangement, from primarily only including the hunting interest organisation SAHWM to increase landowner interests’ influence in the public administration.

A quantitative study of the MMUs revealed that these cannot be characterised as adaptive co-management systems to a high degree due to inadequate monitoring, inability to meet management goals, and failure to apply ecosystem management. Part of the reason for this is that there is an ecological and social misfit since MMUs are too small to contain its own moose populations. Another reason is inadequate knowledge regarding population dynamics on behalf of the local resource users. However, there were variations not only among MMUs but also on the regional level as to the extent of adaptive co-management characteristics.

Two counties were selected for further study due to the fact that the MMUs in one county had more characteristics of adaptive co-management systems than in the other one. The case studies revealed that high levels of conflicts in a corporate arrangement hampered the development of adaptive co-management systems. In the county with low conflict levels regarding the moose question, a key steward holding a key position in the moose administrative system was a critical actor in promoting the development of adaptive co-management systems.

It is concluded that devolution of management rights does not automatically foster adaptive co-management. Nor is a centralized system easily converted to a bottom-up system. The study shows that institutional change is path dependent but also that the State has an important role to play in developing adaptive co-management systems. This is particularly decisive if an ecological and social misfit is likely to arise since the State then can provide linkages both on an organisational level but also on a geographical level and thereby mitigate potential negative effects of local resource systems. However, this role differs significantly from that in conventional resource management and therefore it is also important that the organisation and tasks of the State is ensured legitimacy among both the public and affected resource users.

Key-words: adaptive co-management, institutions, collective action, public administration, local resource management, wildlife.
Acknowledgements

This thesis is dedicated to my grandmother Annie Wennberg because I love you and because you are so cool!

This research was a part of the “Adaptive Management of Fish and Wildlife” research project that was financed by the Swedish Environmental Protection Agency. I thereby want to thank the EPA for financing this research.

I want to thank my supervisor Lars Carlson because it has been so stimulating, and much fun having supervision with you. I have really enjoyed it! I definitely would not have finished this thesis without your help! I also would like to thank my assisting advisors Nils-Gustav Lundgren and Audun Sandberg. I especially want to thank Nils-Gustav for his help throughout the entire data collection process. I also would like to thank Carl Rova, the project leader for being so supportive and for great advice on all kinds of things.

I have had the amazing opportunity to work in a multidisciplinary research project with so many passionate and talented researchers. I would like to extend special acknowledgement to Göran Ericsson, Roger Bergström, and Henrik Andrén for their advice, critical comments, and for sharing their amazing knowledge throughout this process.

I am also grateful for important comments on various parts of the material provided by, Andreas Duit and Camilla Sandström. I also want to thank my colleague Simon Matti for reading and commenting the manuscript. However, the responsibility for the final text is, of course, solely mine.

I also would like to thank Göran Bergqvist at SAHWM for assisting in data collection and treatment, and for sharing his expert advice along the way. I want to thank all the County Administrative Boards’ hunting administrators for providing data and for acting as respondents. I especially want to thank the hunting administrators in the two counties where the interviews took place for being so helpful and friendly, you know who you are!

I also want to thank the members of the political science, law, and economics department for support and entertaining times!

Sadly, both my father and mother have passed away, my father in 2000, my mother this autumn. I want to thank my father for teaching me not to accept anything at face value and for encouraging me to always be curious. I still miss you and your love all the time! I want to thank my mother for showing me that at the end of the day we are only and amazingly enough human beings. You also taught me how to express my emotions and always stand up for myself.

I want to thank my family for support and understanding throughout this process, my brother, Johan, my grandmother, Annie, aunts & uncles, and cousins, Daniel, Hanna, Tobias, André, and Jesper.

I also want to thank all my smart and overall amazing friends! I can’t believe that you all believed in me so much and that you never doubted that I would finish this thesis. So thank you Ulrika, Douglas, Anna-Lena, Corinna, Ellen, Anna R, Anna C, Linda M.

Sofia Wennberg DiGasper
Luleå 2008-10-20
Disposition

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Abbreviations:

CAB  County Administrative Board ("Länsstyrelsen")
CHA  SAHWM County Hunting Associations ("Länsjaktvårdsföreningar")
EPA  Environmental Protection Agency ("Naturvårdsverket")
FA   Forest Agency ("Skogsstyrelsen")
FSF  Federation of Swedish Farmers ("Lantbrukarnas riksförbund")
MMU  Moose Management Unit ("Älgskötselområde")
NBF  National Board of Forestry ("Skogsvårdsstyrelsen")
NFS  EPA Directives ("Naturvårdsverkets föreskrifter")
NHA  Hunters National Association—The Countryside Hunters ("Jägarnas Riksförbund—Landsbygdens Jägare")
SAHWM Swedish Association for Hunting and Wildlife Management ("Svenska jägareförbundet")
SFS  Swedish Statue book ("Svensk författningssamling")
SOU  The Official Investigations of the Swedish State ("Statens offentliga utredningar")
SSNC The Swedish Society for Nature Conservation ("Svenska naturskyddsföreningen")
SÖ   Sweden’s international agreements (Sveriges internationella överenskommlser)
RF   Swedish Constitution ("Regeringsformen")
OLA  Outdoor Life Association ("Friluftsfrämjandet")
WMA  Wildlife Management Area ("Viltvårdsområde")
WMB  Wildlife Management Board ("Viltvårdsnämnd")
Chapter 1

INTRODUCTION

“…development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Our Common Future, 1987).

How can we ensure that future generations will have access to clean air and natural resources? This question has long been debated, and policymakers all over the world are concerned with sustainable resource utilization. How can we allow ourselves to continue to use our natural resources without depleting them or causing changes that will make nature even more unpredictable, such as what humans’ impact on climate changes has entailed? The international community is concerned with these issues; indeed, many countries have signed international conventions such as the Kyoto protocol, the Convention of Biological Diversity, and Agenda 21, thereby demonstrating at least ‘ceremonial’ commitment to future generations’ ability to live under somewhat similar conditions as we do today. The challenge in determining how to mitigate the effects of global warming illustrates that humans’ impact on our ecosystems is paramount and also very unpredictable. It is no longer possible to ignore this interconnectedness between the environment and social systems; we need to find tools to be able to manage ecosystems in a flexible manner—perhaps even at high social costs. It is also imperative that we find ways to develop multidisciplinary research as problems such as global warming cannot be solved solely by natural sciences or social sciences.
The problems are complex. It is not possible to separate ecosystems from social systems as these are interdependent upon one another to such a high degree. Thus, multidisciplinary research is necessary to address these sets of problems. For this purpose, new research agendas and new policies are needed. One significant aspect is how to implement policies in such a way as to ensure sustainable resource utilization in an already existing institutional framework, consisting of norms held by people at large as well as an administrative structure constructed for specific purposes and perhaps not suitable for dealing with problems related to complex ecosystems.

In many countries the public administrations dealing with natural resources were built around a certain way of viewing nature and resources. Conventional resource management has been built on the foundation that human beings could control ecosystems and treat these as linear, predictable, and with a single equilibrium (Berkes, 2003b:28). The use of the conventional resource management approach has been successful when exploiting resources; however, it has at times led to resource degradation, such as in the case of the collapse of ocean fisheries. Therefore, it might not be an appropriate management system for ensuring sustainability (Holling, Berkes et al., 1998; Wilson, 1998). Conventional resource management systems may envisage a strong division between nature and societies; consequently, humans’ impact on ecosystems is not taken into account in the management process (Berkes, 2003b).

The development of new ecological theories and concepts and the apparent limitations of conventional resource management have contributed to the emergence of the adaptive management approach. In the mid-1970s, an interdisciplinary team of biologists and system analysts defined the adaptive management approach; their work was published in 1978 by the Canadian ecological theorist C. S. Holling (Lee, 1993). This work emphasized that ecosystems are complex, non-linear systems in which the only certainty is uncertainty, which management strategies have to accept as an integral part of the ecological system ( Folke, Carpenter et al., 2002). This understanding differs from conventional resource management, which is based upon the idea of command and control over resources, with a goal of maximizing sustainable yields.
The adaptive management process often involves scientists and resource managers cooperating in order to establish appropriate ecosystem models as these models are believed to contribute to problem clarification and the elimination of unproductive options. Perhaps the most important result that model building can accomplish is disclosing gaps in state-of-the-art biological and ecological knowledge. The “missing” information can be obtained by implementing large-scale experiments in the ecosystems, thereby generating new knowledge as well as improving the likelihood for selecting appropriate policies in the future (Walters, 1997). “Adaptive management is grounded in the admission that humans do not know enough to manage ecosystems” (Lee, 2001).

Another aspect of the adaptive management approach is the emphasis on the interconnectedness between ecological and social systems; for example, not taking economic systems into account can jeopardize solutions emanating from an ecological point of view (Walters, 1986). Indeed, social and economic impact assessments of harvesting restrictions in ocean fishery have to be conducted since successful implementation depends on ocean fishermen perceiving these as legitimate. Fishermen can quite easily break the rules since enforcing rules in an ocean fishery is complicated; thus, policy goals will not be fulfilled and perhaps cause even more damage to ecosystems. The adaptive management approach has been applied successfully in various contexts, including the Everglades (Gunderson et al., 1995), the Columbia River Basin (Lee, 1999), ground fishery in Tasmania (Lee, 1999), and waterfowl management in the United States (Johnson, 1999).

Some researchers have studied adaptive co-management in communities that have succeeded in managing resources in a sustainable manner (Berkes, 1996, 1998, 2003b; Berkes & Folke, 1998). The difference between these two lines of research has been defined in the following way:

The first [view] involves rethinking resource management science in a world of uncertainty and surprise, using systems approach and adaptive management (Holling 1978; 1986; Walters 1986; Lee 1993). The second involves rethinking resource management social science by focusing on cultural capital (as an integral part of a triad with economic capital and natural capital), and on property-rights system (Berkes and Folke 1994a; 1994b) (Holling, Berkes et al., 1998).
The second line of research—called adaptive co-management—has focused on the local resource users and their ability to manage resources sustainably due to, among other factors, their local ecological knowledge. One definition of adaptive co-management states it is “a process by which institutional arrangements and ecological knowledge are tested and revised in a dynamic, ongoing, self-organized process of trial-and-error” (Folke, Carpenter et al., 2002:20). An important aspect of this definition is to determine to what extent local resource users have managed to build social-ecological resilience by adapting to ecosystem changes. Social-ecological resilience has been defined as:

1) the amount of disturbance a system can absorb and still remain within the same state of domain of attraction,
2) the degree to which the system is capable of self-organization (versus lack of organization, or organization forced by external factors) and,
3) the degree to which the system can build and increase the capacity for learning and adaptation (http://www.resalliance.org/ev.php).

If conventional resource management is based on a non-appropriate image, a pertinent question emerges: What kind of administrative system would be suitable for managing complex ecosystems?

Typically, conventional resource management systems are the so-called top-down systems; in other words, decisions on natural resource utilization are decided in a hierarchical organization. The resource users are expected to follow rules and regulations implemented by the public administration. However, due to the problems of top-down management systems—not only from an ecological point of view, but also because these systems tend to be expensive to maintain and are often perceived as illegitimate by resource users—alternative management systems have been suggested. Legitimacy problems can arise as top-down systems are inflexible and therefore cannot take into consideration rapid changes or local contexts. Trends over the past decades have aimed at decentralizing the management of natural resources throughout the world, in both industrialized and developing countries (Agrawal, 2001). Perhaps decentralization of natural resources could be an alternative form of management more
suitable for achieving sustainable resource use than conventional resource management.

In 1993, Sweden signed the Convention on Biological Diversity (CBD),¹ in which Sweden agreed to the three main goals of the convention: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources (SÖ, 1993:77). The ecosystem approach is perceived as facilitating the CBD goals. The so-called Malawi principles were established as operational guidelines in order to provide advice on how to implement the ecosystem approach. An ecosystem is defined as “a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit” (www.cbd.org). The CBD provides five general guidelines for the implementation of the ecosystem approach, including the utilization of adaptive management. One of the Malawi principles is that management of natural resources should always be decentralized to the lowest appropriate level. Decentralized systems are considered to enhance both effectiveness and equity as well as contribute to greater responsibility, accountability, and use of local ecological knowledge (www.biodiv.org).

Researchers have highlighted several advantages of local resource systems over centralized systems. One benefit is that local appropriators have knowledge of the resources and surrounding environment and receive feedback from changes in the environment. Another aspect is that local appropriators are more likely to draft rules contributing to greater reciprocity and higher levels of trust than public officials without knowledge of the characteristics of the community and its norms. In addition, the costs for enforcing rules are low in communities. Perhaps the greatest benefit is that, if a local resource system fails, the consequences will not affect as great an area as if a central agency is unsuccessful with its natural resource management policies (Ostrom, 2005:281–282). However, adaptive co-management requires considerable effort from local resource users; these users also need to possess the rights to manage the natural resources. One prerequisite for resource users establishing institutions is the

¹ The CBD contains 32 articles.
right to organize; if local resource users are to establish adaptive management systems, this prerequisite would be a minimum requirement (Ostrom, 1990). Other researchers have emphasized the need for extensive management rights for resource users to establish adaptive co-management systems (Adger, 2002/2003; Olsson, Hahn et al., 2004).

“Adaptive comanagement systems are flexible community-based systems of resource management tailored to specific places and situations and supported by, and working with, various organizations at different levels” (Olsson, Folke et al., 2004:75). However, the devolution of management rights does not necessarily mean that local resource systems will develop into adaptive co-management systems. Local systems are not only local. Research has found that long-enduring local management systems of common pool resources are usually nested within even larger organizations. Such a polycentric governance system requires that citizens are able to organize multiple governing units and that each unit exercises considerable independence to make and enforce rules within a jurisdiction for a specified geographical area (Ostrom, 2005:283). Although emphasis is placed upon the importance of local resource systems in managing resources, this cannot be done without the support of other organizational levels (Folke, Hahn et al., 2005:449). The idea is that governance systems at higher levels can counteract some of the difficulties that face the local resource system, such as a lack of scientific information, a lack of funds, an inability to manage larger common pool resources, and conflicts between appropriators (Olsson, Folke et al., 2004; Ostrom, 2005).

Swedish authorities have in several official reports proposed an adaptive management approach in order to ensure sustainable resource use in oceans, terrestrial

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2 This is one of Ostrom’s eight design principles for long-lasting common pool resources. The others are clearly defined boundaries; congruence between appropriation and provision rules and local conditions; collective choice arrangements; monitoring; graduated sanctions; conflict resolution mechanisms; and nested enterprises (Ostrom, 1990).

3 Common pool resources are goods with characteristics that make it difficult to exclude potential appropriators. Moreover, where joint use also indicates subtractability—that is, when one person deducts units from the resource—these resources adversely affect the ability of others to use the resource.
waters, regarding wildlife, and predatory animals⁴ (SOU, 2003:72; EPA Report 5301; SOU, 2007: 89). An international review of Swedish wildlife research suggested that large-scale adaptive management experiments should be performed in order to improve wildlife management (EPA Report 5179). The Swedish Environmental Protection Agency (EPA) recently changed its policy direction regarding the management of moose by declaring the intention of implementing adaptive management (EPA Report 5301). Adaptive management is defined in the following sense: “…the management system should be adaptive, that is continuously transform knowledge (inventory data and science) into practical application and evaluate the practical application” (EPA Report 5301:39). Since the Swedish state is planning on implementing adaptive management regarding moose, it is of interest to examine the current situation.

Moose are a popular animal to hunt, in Sweden, and there are approximately 267,000 hunters. The Swedish moose management system was established in the beginning of the 1930s in order to ensure the survival of the species, which at the time was almost extinct due to over-harvesting. The state chose a corporate arrangement, and the Swedish Association for Hunting and Wildlife Management⁵ (SAHWM sw. Svenska jägareförbundet) was officially put in charge of wildlife care in Sweden (SOU, 1997: 91). The management system constructed during the 19th century can be defined as a top-down management system with detailed regulation of resource extraction. However, over the last few decades, alterations in formal rules have led to the devolution of management rights and the deregulation of moose policies. Such changes in the moose management system aimed to decrease the high administrative costs while allowing local actors to solve the grazing-related problems (Prop. 1991/92:9). Natural resource utilization is often fraught with conflict; in the case of moose, a significant conflict exists between the forest sector and hunting interests since

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⁴The EPA is financing a multidisciplinary research program called “Adaptive Management of Wildlife and Fish,” which this thesis is a part of.
⁵ SAHWM is Sweden’s largest interest organization of hunters and was established in 1830. SAHWM was delegated the authority to manage wildlife care in Sweden through parliamentary decisions in 1938 and 1951 (Fransson, 2003:8). This assignment was renewed in 2000 (Prop. 1999/2000: 73).
large moose populations cause grazing damages to commercially valuable tree species, such as pine.

The change in official moose policy has led to increased management rights when hunting rights owner establish so-called Moose Management Units (MMU sw. älgkötselområden). These MMUs can decide the number of moose that hunters are permitted to shoot during the hunting season, while County Administrative Boards (CAB) decide moose allocation for other moose management organizations, such as Wildlife Management Areas (WMA sw. viltvårdsområden). This is a critical right for resource users to exert if they are to be able to manage moose populations as approximately one third of the moose population is decimated during the yearly hunt. It can thus be assumed that one of Ostrom’s criteria for successful CPR is fulfilled—namely, local resource users’ right to organize. At the same time, very few formal rules regulate MMUs. The only requirement is that hunting rights owners at the time of the establishment of the MMU have to hand in a management plan to the CAB containing among other things the number of moose they plan to shoot.

Thus, the formal institutional prerequisites for adaptive co-management systems are presumably in place to deal with moose management. The MMU has proven to be a popular way of organizing moose hunting in Sweden and is used throughout the country by landowners and hunters today. Although the intentions behind the policy change allowing for the establishment of MMUs was not per se that these would become adaptive co-management systems, they provide a ‘natural’ experiment to test whether these local moose management systems have developed into adaptive co-management systems.

MMUs are implemented in an already existing institutional framework that is made up of formal rules, such as property rights, norms held by people, public administration, and interest organizations, among other things. The concept of polycentric institutions highlights the importance of complementary jurisdictional levels to that of local systems since certain management tasks are better solved at higher jurisdictional levels (Ostrom, 2005). These tasks are usually performed by public administration in industrialized countries. However, in modern societies,
various models of administrative structures have developed in order to ensure citizens’ legitimacy. These include the legal-rational bureaucracy, professional model, corporatism, client model, political representation model, and lottery-based model.

One important explanation for the existence of these distinct types of administrative structures is the question of legitimacy since citizens need to find that the public administration has legitimacy, and is trustworthy because it is via contacts with it that the citizens actually encounter laws and policies, and are most importantly forced to submit to its authority (Peters & Pierre, 2003; Rothstein, 1992, 2003).

It has been highlighted that it is of importance to “…recognize the challenge for resource agencies and researchers to shift from conventional to a complex adaptive system perspective” (Plummer & Armitage, 2007:62). The difficulties associated with changing an existing management system such as conventional resource management, in which various resources might fall under the jurisdiction of various state agencies, has been pointed out (Imperial, 1999).

Aims of the thesis:

As has been emphasized, new insights about the functions of ecosystems has led to the critique of conventional resource management systems. These might be efficient for resource exploitation but less apt at ensuring sustainable resource utilization. Alternative management systems and approaches such as ecosystem management, adaptive management, and adaptive co-management—taking into consideration angles such as ecosystem complexity and uncertainty in the management process—have been proposed as more suitable for ensuring sustainable resource utilization. The international community advocates the implementation of these new management systems; meanwhile, Sweden has signed conventions such as the CBD, thereby committing itself to implementing them. In general, this involves a conversion of public administration from conventional resource management systems to adaptive management systems.

However, the conversion of a public administration established for a conventional resource system to adaptive management or adaptive co-management
might not be so easily accomplished (Plummer & Armitage, 2007). As previously mentioned, various types of public administration models have been developed in order to ensure the legitimacy of citizens (Rothstein, 1991). It is reasonable to assume that an existing administrative structure responsible for certain natural resources might have characteristics of different administrative models that have developed over time to meet changing policy goals of the state. This also necessitates that certain structures, actors, organizations, and so on constitute an institutional reality that exhibits path dependencies that might be difficult to alter. For example, if certain interest organizations have been involved in the implementation of policies, these would probably oppose changes that would diminish their influence. As the principal focus is on the role of the local resource users and collective action among these in the adaptive co-management approach, less focus has been paid to the existence of natural resource conflicts and the type of public administration that would promote the development of these local systems. Therefore a pertinent issue is how a public administration established for adaptive co-management can be legitimate for citizens. For example, how can civil rights, administrative law, and appeals systems be ensured in a public administration focusing on dealing with ecosystem complexity, non-linearity, and surprises that require flexibility and at times perhaps rapid and invasive management measures?

As previously mentioned, researchers and the international community have suggested that adaptive co-management or variations in collaborative arrangements between stakeholders may be one way of achieving sustainable resource management (Carlsson & Berkes, 2005; Conley & Moote, 2003; Kellert, Mehta et al., 2000; Plummer & Armitage, 2007; Plummer & FitzGibbon, 2004). However, critiques have also been directed toward adaptive co-management outcomes. Potential problems with co-management include the circumvention of environmental laws. It has also been argued that the devolution of decision-making powers restricts accountability as well as creates power imbalances and that special interests are provided an arena at the expense of public interests (Bryan, 2004; Conley & Moote, 2003; Mikalsen & Jentoft, 2003). It is possible that the problems are worse, but few evaluations have been
conducted regarding the outcomes of adaptive co-management. Therefore, it is critical that research close the gap that currently exists between theory and practice. Thus, there is a need for further evaluations (Bellamy, Walker et al., 2001; Conley & Moote, 2003; Kellert, Mehta et al., 2000; Plummer & Armitage, 2007; Plummer & FitzGibbon, 2004).

Researchers who have paid attention to the lack of consistent evaluations of outcomes of collaborative efforts have highlighted viewpoints that should be considered—namely, applying a systems perspective, integrating diverse disciplinary perspectives, applying methodological pluralism, considering both ecological and social impacts, taking into account the importance of process, social learning, responding and adapting to feedback, pluralism and linkages, and so on (Bellamy, Walker et al., 2001; Conley & Moote, 2003; Plummer & Armitage, 2007). An evaluation of outcomes of community-based natural resource management (CNRM) in five cases concluded that certain factors should generally be assumed, including the fact that interest group and stakeholder conflict are the norm rather than an exceptional condition, the involvement of heterogeneous interest groups, extensive institution building is necessary prior to implementation, substantial disparities will exist between ecosystems and species with large territorial requirements and the needs of local peoples, and educational efforts will be imperative (Kellert, Mehta et al., 2000). The most successful case studies were North American co-management systems of salmon in Washington and Alaska due to their focus on single species, legal support, and a more developed organizational infrastructure, with considerably more funds available (Kellert, Mehta et al., 2000).

Sweden provides a “natural” experiment to test the assumption that local resource users will develop adaptive co-management systems if they gain management rights. As MMUs are spread throughout the country and are embedded in the same institutional context, such as the same legal framework, administrative structure, existence of similar interests groups, and so on, thereby is providing an opportunity to increase our knowledge of what promotes as well as respectively hampers the development of adaptive co-management systems. It also facilitates the
problematization of converting one type of administrative system into a fundamentally different one and the problems that presumably will arise in connection with such a conversion. This thesis addresses these problems and should thus be regarded as yet another piece of the puzzle in regards to how to achieve management systems that will ultimately lead to more sustainable resource utilization. Although this study is based on an investigation of the Swedish moose management system, the lessons learned herein are likely to be applicable to other resource systems as well. The thesis sets out to answer the following questions:

**Question I:**

*To what extent are Swedish MMUs adaptive co-management systems?*

One aim of this thesis is to clarify to what extent Swedish MMUs can be characterized as adaptive co-management systems. To clarify to what extent Swedish MMUs are adaptive co-management systems, a database has been established based upon the management plans that all MMUs must hand in to the County Administrative Boards (CAB). The database consists of variables such as monitoring methods, amount of grazing damages, and goals regarding the size of the moose population, which can be operationalized as characteristics of adaptive co-management systems. As most research within the adaptive co-management literature consists of case studies, the current study is complementary. The main empirical work in this thesis is a quantitative study based on the described database. The data provide an opportunity to test whether adaptive co-management systems have developed on a national scale.

**Question II:**

*What characteristics of the public administration contribute and hamper the development of adaptive co-management systems?*

The MMUs were established in an already existing institutional framework. It is assumed that the existing institutional framework will affect the possibilities for the development of adaptive co-management systems. As is highlighted in the adaptive
co-management literature, local systems have to be connected with other local systems and other organizational levels, such as public administration (Ostrom, 2005). Therefore, the second aim of this thesis is to examine the historical changes in the moose administrative structure and clarify what characteristics the current system exhibits. Hence, the study also consists of a document analysis that examines bills, official investigations, and comments by numerous interest organizations relating to changes in the Swedish moose administrative system. The historical analysis will therefore provide clues as to what constitutes the institutional past.

The formal organization of the public administration regarding moose hunting is similar in the various counties in Sweden. However, if there are differences in the extent of MMUs that can be characterized as adaptive co-management systems in the various counties, it would provide an opportunity to investigate what characteristics of the public administration promote as well as hamper the development of adaptive co-management systems. Therefore, two counties have been selected from the MMU database based on differences in adaptivity.

**Question III:**

*In what respect do the current structural features of the Swedish moose administrative system differ from structural features highlighted in theory as critical to an “ideal adaptive co-management administrative system”?*

The third aim is to elucidate the structural problems that exist in the current moose public administration system that may inhibit the implementation of adaptive co-management in the Swedish moose management system.

**Disposition of thesis:**

This thesis is structured as follows. The first part (Chapters 2, 3, and 4) introduces the key concepts utilized in the thesis. Chapter 5 discusses the methodologies used in this thesis. In the second part of the thesis (Chapters 6 through 12) the moose administrative system and MMUs are investigated and analyzed. Finally, Chapter 13 presents the conclusions.
Chapter 2 discusses and problematizes the concept of institutions. The main challenge in resource management is to establish institutional arrangements that will bring about collective action in order to avoid resource degradation. Critical formal rules regarding natural resource management include property rights, as resource extraction is usually connected to landed property. Property rights are complex, and two aspects tend to have significant impact on possibilities for sustainable resource utilization: 1) the fact that the size of properties is often too small to permit sustainable resource utilization without collective action among local resource users and 2) property rights consist of bundles of rights that may affect the incentives of local resource users in managing resources. As previously discussed, adaptive co-management requires substantial management efforts of local resource users; therefore, it is important that they have incentives to invest time and effort. As a result, the complexity of property rights and implications of their alterations will be discussed in detail. Moreover, institutional change (i.e., what brings about changes in formal rules and norms) is also thoroughly discussed in this chapter. The interaction between formal rules and norms will also be described to facilitate the understanding of how new formal rules might not always be so easily implemented or bring about the intended consequences. In addition, organizations’ roles in regards to changes in formal rules as well as in affecting their members’ responses to changes in formal rules are discussed. Thus, the chapter will provide the analytical tools necessary to analyze the institutional arrangements of the moose administrative structure.

Chapter 3 discusses adaptive management and adaptive co-management in relation to what characteristics of the public administration are required in order to implement each of these approaches. In addition, this chapter provides information to facilitate the operationalization of the adaptive co-management concept.

Chapter 4 compares adaptive co-management and conventional resource management systems, particularly in regards to the grounds of legitimacy of the public administration and its organization and tasks carried out.

The second part of the thesis investigates and analyzes the moose administrative system. Chapter 6 provides a description and analysis of the historical changes in the
Swedish moose management systems since their establishment in the 1930s. This chapter also contains an analysis of the positions taken by several state agencies, such as the Forest Agency (FA), the Environmental Protection Agency (EPA), the County Administrative Boards (CAB), hunting organizations, and forest sector organizations, regarding the proposed policies that—among other things—allowed for the establishment of MMUs.

Chapter 7 details the current hunting administration and provides a description of the formal rules regulating MMUs.

In Chapter 8, the institutional arrangements of the moose administrative system are analyzed. The chapter first discusses how the Swedish state has tried to establish institutions aimed at promoting collective action, including the difficulties associated with such policy measures. The chapter then provides an analysis of the evident characteristics of two ideal types of public administration in the moose administrative system: the corporate model and the legal-bureaucratic model—both of which can be found in the Swedish moose administrative system. Finally, the institutional arrangement of the moose administrative system is discussed from a top-down versus bottom-up management perspective.

Chapter 9 addresses the question of to what extent MMUs can be characterized as adaptive co-management systems.

In Chapter 10, the results from the national CAB questionnaire are presented. The level of conflict regarding the moose question as well as MUUs’ integration into the regional moose management system and the CAB’s administrative routines of these are analyzed.

Chapter 11 presents the results from the two case studies, analyzing them in regards to whether the differences in the level of conflict can explain differences in adaptive co-management systems in the two counties. Conflicts regarding the size of the moose populations in Sweden have emerged due to the fact that moose cause grazing damages on commercial tree species. Naturally, existing conflicts exacerbate possibilities for various stakeholders to collaborate on natural resource management issues.
Chapter 12 discusses the actors in the regional moose administrative structure and their relationships, addressing the third question of this thesis. As such, this chapter also contains a comparison between the current regional moose administration and an ‘ideal type’ adaptive co-management system.

Finally, the conclusions are presented in Chapter 13.
Chapter 2

THE CONCEPT OF INSTITUTIONS

In this chapter, institutional theory and—specifically—institutional change theory are introduced. The chapter focuses on clarifying central concepts used in this thesis. In order to provide an understanding of a complex context over time, it is fruitful to use manifold theories of institutions and institutional change since they all have their unique weaknesses and strengths. Institutional theory is therefore used more as “toolbox” for gaining insights into the complexities of natural resource management and ultimately explaining difficulties associated with the development of adaptive co-management systems and conversions of conventional top-down natural resource management systems. Although the aim is not per se to contribute to the development of institutional theory, this discussion will provide insights into how diverse theories of institutions can be used simultaneously when analyzing a complex context over time. Institutional theory is productive in this thesis since certain formal rules, such as property rights, are critical in understanding resource management systems. Natural resource utilization is often regulated by formal rules implemented by the state; however, formal rules can be counterproductive if not in accordance with the norms of society and thereby cause legitimacy deficits. The first section discusses the main concepts and ideas underlying institutional theory, focusing on differences between formal (i.e., written) and informal rules that are constituted by the norms in society and how these interact (North, 1990). Furthermore, the role of organizations and how these affect changes in formal rules will be discussed (Nee & Ingram, 2001; North, 1990). The complex interaction between formal rules and norms as well as the role of
organizations—not only in trying to influence the political system but also when explaining their role in influencing their members’ responses to changes in formal rules—will elucidate the complexity in the current moose administrative system.

Thereafter, the discussion turns to property rights as these consist of critical rules regarding the management of natural resources. In order to explain the complexity of the property rights system and its effect on actions taken by local resource users, Ostrom’s hierarchy of rules is used (Kiser & Ostrom, 1982). This theory is well suited for explaining how rules decided at the highest level in the political system affect rules on lower levels in the system. As the content of property rights rules decided at the highest level in the system affect the possibilities for collective action among property rights holders, this hierarchical view of rules is productive in explaining difficulties in forced collective actions among property holders, although potentially necessary from an ecosystem perspective. In addition, Ostrom and Schlager have developed concepts that detail the content of property rights, which will be useful in this case as these demonstrate the importance of changes in the formal rules allowing for the establishment of MMUs (Ostrom & Schlager, 1996).

The chapter concludes with a discussion on how and why formal rules and informal rules change in societies. Knight’s bargaining theory of institutional change will be explicitly applied while analyzing diverse actors’ stances in relation to changes in formal rules in the Swedish moose administrative system that occurred in the early 1990s. This theory is productive in this case as it focuses on distributional effects of various rules as well as on actors’ relative bargaining strength. It is also helpful to utilize when analyzing the current regional moose administrative systems since the system provides arenas for the two conflicting interests—namely, the forest sector and hunters—to negotiate rules, thereby resulting in distributional consequences. For example, due to historical institutional arrangements, certain actors within the system have gained substantial bargaining strengths, which can counteract the efficient implementation of new formal rules.
New institutionalism is a theoretical framework that has become increasingly important within numerous disciplines, including political science, economics, and sociology. The Nobel Prize laureate, Douglass North, has a well-cited definition of institutions: “Institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction” (North, 1990:3). Various theories exist on what institutions are and how they change over time; however, all share some common features. Institutions contain a structural feature requiring that single individuals do not create institutions on their own; instead, they relate to a group of people who have a common understanding (Peters, 1999). Institutions also show some sort of stability, although the question of stability has been debated among institutional theorists (Ensminger, 1992; Peters, 1999). In addition, institutions affect individual behavior by establishing expectations and incentives that people take into consideration when making decisions (Knight, 1992). In a world without institutions, people would know neither how to act nor how to cooperate. “Social rules ensure predictability through their normative or prescriptive force; they impose obligations and create corresponding entitlements, which are publicly acknowledged and collectively enforced” (Beetham, 1991:65).

Formal and Informal Rules:
People choose to follow rules in part because these are enforced (e.g., by a state) with a violent monopoly or by social sanctions carried out by a group. Most scholars differentiate between formal rules enforced by the state and informal rules enforced by other individuals affected by the norm or by the fact that the norm has become internalized (Axelrod, 1986; Coleman, 1994; Knight, 1992; North, 1990). A norm is internalized when individuals breaking it sanction themselves through, for example, feelings of guilt. Formal rules form a hierarchy with constitutional law at the top while operational rules are at the bottom. Informal rules are often defined as conventions and norms in a society (North, 1990).
A norm concerning a specific action exists when the socially defined right to control the action is held not by the actor but by others[…] there is a consensus in the social system or subsystem that the right to control the action is held by others (Coleman, 1994:243).

In other words, norms exhibit system properties while an action, such as smoking, is no longer controlled exclusively by the actor, but by a norm informing him or her where this action might take place. Many times, norms precede the enactment of a law; if a norm becomes a law, private enforcement mechanisms are supplemented by the law enforcement establishment. In general, a law clarifies obligations more explicitly than a norm does; in other words, less ambiguity exists when people interpret a law (Axelrod, 1986).

It is beneficial to distinguish between formal and informal rules. In democratic societies, the elected representatives decide laws in parliament and are held accountable for their decisions in subsequent elections. The laws are implemented by the public administration that is accountable via administrative laws; however, in reality the bureaucracy is also concerned with the formulation of policy. A law-governed society is characterized by an organized production of laws and a hierarchal system for interpreting laws, usually with a supreme court. In democratic societies, a constitution prescribes the procedures by which parliament may enact laws and how the government and departments can enforce acts (Hyden, 2002). Another characteristic of formal rules is the existence of a judicial “language” and the legal profession. As previously mentioned, one difference between a norm and a law is that the law usually explicitly expresses the rule—for example, a term such as waste is defined through a judicial process, ultimately becoming very exact—which would be almost impossible to accomplish if it was a norm. Finally, a law-governed society is connected to a state with a violent monopoly (Hyden, 2002). Formal rules are applicable on a general level; for example, the formal rule against stealing is applicable to all citizens. Although an informal rule exists in society as a whole against stealing, this might not be the norm in a criminal gang. In addition, very few formal rules regulate our private lives; exceptions are formal rules protecting human life and
integrity and certain rules regulating family life, such as marriage and inheritance (Hyden, 2002).

Formal rules, in even the most developed economy, make up a small (although very important) part of the sum of constraints that shape choices; a moment’s reflection should suggest to us the pervasiveness of informal constraints. In our daily interaction with others, whether within the family, in external social relations, or in business activities, the governing structure is overwhelmingly defined by codes of conduct, norms of behaviour, and conventions. Underlying these informal constraints are formal rules, but these are seldom the obvious and immediate source of choice in daily interactions (North, 1990:36).

In this thesis, property right rules are of great importance as these determine whether resource users will possess management rights, which is critical for the establishment of adaptive co-management systems. However, even if clear property rights exist regarding moose management, it is likely that informal rules also influence the actions of hunters and landowners. The formal rules might contradict norms to which hunters adhere, such as in the view of who should decide the size of a moose population. The circumstance that hunters actually shoot their assigned quotas is repeatedly brought up in official investigations regarding the conflict between hunting and forest interests in Sweden (Prop. 1991/92: 23; EPA Report 1990:11).

Both formal and informal rules coexist in societies; sometimes they converge, and at other times they are contradictory. For example, in regards to theft, both formal and informal rules constrain peoples’ behavior. If the two converge, they are mutually enforcing. However, if there is a conflict, it is costlier for third-party enforcers to ensure that the formal rule is followed (Nee, 2001). Ellickson has demonstrated how cattle ranchers in Shasta County solve cattle trespass problems through informal rules rather than resorting to the traditional court system because the former was less expensive. Only when a trespass conflict could not be resolved using graduated informal sanctions did people resort to the judicial system (Ellickson, 2001). Moreover, if a person makes the decision to steal something, that person risks not only social disapproval, but also punishment as dictated by the state. However, the chance for detection increases if not only third-party enforcers can detect deviation from the rule, but also neighbors.
Convergence of formal and informal rules also reduces uncertainty in social interactions (Nee & Ingram, 2001). If a conflict emerges between a formal and informal rule, it might be difficult for people to know what rule it is that affects other people’s behaviors. This coexistence of formal and informal rules is the reason for the difficulties in changing societies fundamentally by means of revolution as changes in formal rules do not necessarily translate into changes in informal rules (North, 1990). Research regarding the legitimacy of law 6-regulating cooperation among landowners in relation to hunting—the Wildlife Management Areas (WMA sw. viltvårdsområde)—in Norrbotten County, Sweden, revealed that despite the fact that the entity specifically regulated issues, such as the issuing of hunting permits, informal rules were utilized by the actors due their disagreements as to the content of the formal rules (Fell, 2006). Indeed, informal rules are path-dependent as conformance to norms is met by reward and disobedience is met with social disapproval (Nee & Ingram, 2001).

Regarding the low legitimacy for the official predatory policy in Sweden, in a report investigating the legitimacy of the predatory policy and illegal hunting, the Swedish national council for crime prevention stated that, “In relation to illegal hunting it is like we are living in a lawless country” (Brå Report 2007: 32:8). The report concludes that attitudes among the populace need to be altered as traditional methods for dealing with illegal hunting are useless due to the indirect support for illegal hunting, resulting in very few convictions (Brå Report, 2007: 32:8). Various dimensions exist to the concept of legitimacy; as such, it is necessary that congruence occur between these in order to avoid legitimacy deficits. Beetham’s three dimensions of legitimacy, based on empirical observations, are adherence to established rules; rules are justifiable from shared beliefs in society; and expressed consent exists at least among the most powerful groups of subordinates in society (Beetham, 1991). If shared beliefs in society are not in congruence with formal rules, legitimacy deficits will emerge. Beetham’s dimensions can be applied to the micro level, such as on different policy areas. Legitimacy deficit is often a problem regarding natural resource

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6SFS, 2002:592 Om viltvårdsområden
management and is especially problematic regarding common-pool resources that are mobile, such as fish and wildlife, due to monitoring difficulties. The legitimacy deficits of the Swedish predatory policy can be attributed to the lack of shared beliefs—that is, many people in Sweden do not share the same values as those underpinning the Swedish official predatory policy, which in turn leads to the development of norms among some groups of people sanctioning illegal hunting.

If norms are important in order to understand people’s behavior, what constitutes norms in a society? One difficulty in answering this question is determining how to distinguish between regularized behavior and norms. The difference between a rule and regularity in behavior can be determined by the reaction of a community. If a person breaks a rule, the transgression will be sanctioned by the community. If a person just alters his or her behavior, people might be surprised, but the change will not be rebuked (Ensminger & Knight, 1997).

“Informal norms are rules of a group or community that may or may not be explicitly stated and that rely on informal mechanisms of monitoring, such as social approval and disapproval” (Nee & Ingram, 2001:19). Many times the sanctioning of disregard for informal rules is quite tough. For example, in Norrbotten County, Sweden, trawler fishermen sanctioned disobedience with informal rules by holding a meeting with the offenders, during which time heated discussions occurred. The offending fishermen had to face their colleagues and hear the critique of their offense, which was probably a more effective sanctioning mechanism than, for example, receiving a fine (Rova, 2004). Individuals sanction non-compliance with informal rules dealing with routine manners in everyday interactions; people who conform to norms have an incentive to ensure that these are followed as doing so automatically reinforces their status as conformers. The costs for monitoring informal rules are less if the people affected by the norm interact frequently, which allows for a higher degree of information sharing (Nee & Ingram, 2001). In regards to hunting, the fact that hunting teams usually have only a few members means that they can easily monitor and sanction each others’ actions. Counties in Sweden in which hunting is an important part of the culture and exercised by local persons have a greater likelihood
of strong norms developing than counties in which people reside in different locations from where they hunt and only hunt as a recreational hobby for a week or two during the year. However, individuals organize themselves; therefore, it is also relevant to discuss the role of organizations in relation to formal rules and norms.

**Institutions and Organizations:**

North, among other scholars, distinguishes between institutions and organizations. *Institutions* are the rules of the game, while *organizations* are players who are restricted by the rules, but can also change them. Organizations can be political bodies, economic bodies, or social bodies and are formed to achieve some common purpose (North, 1990). It is analytically beneficial to separate organizations from institutions as diverse models are required to analyze their operations and interactions (North, 1995). For example, formal rule change is usually viewed as a bargaining process between actors, such as the state and special interest organizations (Knight, 1992; Libecap, 1993; North, 1990). How this process takes place is dependent on the role of interest organizations in society and whether a strong demarcation exists between the state and the civil society. In the pluralist model, a basic assumption is that a strong demarcation exists between the civil society and the state; however, in the corporate model, strong linkages between the state and civil society are believed to be present. In the pluralist model, it is assumed that interest organizations have no systematic impact on policy due to the fact that political decisions are a result of group struggles and power is dispersed, resulting in various coalitions at distinct times. In neo-corporatism⁷, it is assumed that a limited number of interest organizations exist that are highly organized and that their participation in the political process is integrated to the degree that governmental actors bargain with these in order to reach agreements (Klijn, 1997). One definition of corporatism is stated as the "…officially sanctioned participation of organizations in decisions governing affairs of the State, or in their administration, or similar actions carried out by organizations on behalf of the State" (Lewin, 1994:66).

⁷The definition neo-corporatism is used to differentiate it from totalitarian corporatism, which argues that the citizen as an individual lacks rights in relation to the state. It is only by the individual's membership in an organization—officially sanctioned by the State—that the citizen can affect politics and fulfill his or her needs (Rothstein, 1992:12).
Sweden has been pointed out as a country that is very corporative although there has been a decline in corporative structures, in part due to the disintegration of corporate arrangements on the labor market (Lewin, 1994; Lijphart & Crepaz, 1991). Corporate arrangements have been widely used by the Swedish state regarding the environmental policy area; for example the Swedish Society for Nature Conservation (SSNC) held a semi-official position until the end of the 1950s (Rothstein, 1992). The Swedish Association for Hunting and Wildlife Management (SAHWM) was granted authority to execute wildlife management care through parliamentary decisions in 1938 and 1951; as a result, the wildlife sector can be characterized as corporatavistic and of long endurance (Fransson, 2003). This assignment was renewed in 2000 (Prop. 1999/2000:73:70).

An organization implements its own rules within the organization, which are enforced by various sanctioning mechanisms. “When the formal norms of an organization are perceived to be congruous with the preferences and interests of actors in subgroups, the relationship between formal and informal rules will be closely coupled” (Nee & Ingram, 2001:33). One example of this is the “publish or perish” scenario that exists within universities, a scenario prescribed by both formal and informal rules. When formal and informal norms in an organization converge, they increase organizational performance; however, if they do not converge, the result is often feelings of alienation and stress among people within the organization (Nee & Ingram, 2001). This aspect can become problematic in the neo-corporative model as interest groups can be co-opted by the state. Interest organizations participating in the political process and public administration always risk losing the trust of its members as they can come to be viewed as a instrument of the state rather than pursuing members’ interests (Rothstein, 2003).

The boxes in Figure 1 form a hierarchy in which the arrows pointing downward illustrate constraints placed by a higher level on a lower level. For example, formal norms can be laws regulating the organization of organizations. The arrows pointing upward in the figure illustrate that “…hierarchically superior levels are constituted and created by levels below” (Nee & Ingram, 2001:32). The upper box in
the figure contains formal rules that constrain organizations in a society through organizational rules. When changes in formal rules occur, organizations will adapt; those who do not adapt will be negatively affected by selection pressure.

![Diagram](image)

**Figure 1. A Model for the New Institutionalism in Sociology (Source: Nee & Ingram, 2001).**

However, formal rules also directly affect individual action by altering incentives and endogenous preferences (as illustrated by the arrow on the right-hand side of Figure 1). For example, if a change occurs in the formal rule regulating property rights, some individuals’ incentives will change; consequently, their actions will likely also change.

Organizations have formal rules that are enforced upon its members by sanctions, thereby affecting subgroups in the organizations (as illustrated by the arrow pointing downwards from the middle box to the lower box). Subgroups in organizations will comply with the formal rules of the organization; however,
“informal norms will evolve into ‘opposition’ norms if institutions and organizational sanctions are weak relative to contradicting group interests” (Nee & Ingram, 2001:35). When opposition norms emerge, subgroups and individuals within the organization will actively resist formal rules of the organization. As previously discussed, the efficiency of an organization is dependent upon the congruence of formal and informal rules as contradictions can result in distress among members and consequently poor production. Yet organizations will try and affect their members’ responses to changes caused by formal rules that directly affect individuals (as is illustrated by the arrow pointing from the top box to the lowest box on the right-hand side in the figure). For example, one important aspect is that of informing members as to the existence and content of new formal rules.

Organizations also affect formal rules through collective action (as illustrated by the arrow pointing upwards from the middle box to the top box). Organizations try and alter formal rules to benefit their organizational aim, for example, through lobbying or participating in referral systems, in order to exert influence over political decisions (Nee & Ingram, 2001). However, as previously discussed, depending on the overall linkages between interest organizations and the state, possible ways to influence formal rule change will differ. If corporate arrangements are used, the participation of interest organizations is institutionalized. Interest groups can participate in policy making and execution through various avenues, such as the initiative of the political agenda, official investigations, body to which a proposed legislative measure is referred for consideration, representation on boards, and responsibility for carrying out public administration assignments (Petersson, 1991). In Sweden, interest organizations have been able to exert influence via official investigations, creating an important forum for political agreements; however, the extensive referral system of reports and proposed laws has also signified an important channel for interest organizations to make their opinions heard (SOU, 1990: 44:180). In regards to hunting in Sweden, both hunting interests organizations and forest interests organizations are used as bodies to which proposed legislative measures are referred for consideration. However, another effect of corporate arrangements is the monopoly situation that arises when the state grants
an interest organization the assignment to represent a particular sector. The monopoly position denotes increased power resources, which can be utilized to further secure an organization’s position against competing interest organizations (Rothstein, 1991).

The lowest box in the figure illustrates that individuals simultaneously create and are affected by informal norms and that these norms relate to small groups (Nee & Ingram, 2001). The differences between the establishment, change, and enforcement of informal norms and formal rules have been discussed at length in the previous sections. New formal rules will affect the incentives for individuals while existing norms still provide prescriptions as to the accepted behavior in the community; thus, if contradictions emerge, individuals struggle with choosing to adhere to either the existing norms or the formal rules. Meanwhile, organizations try and influence their members to act in certain ways, perhaps encouraging their members to follow new formal rules if these are considered beneficial to the organizational goals, thereby providing individuals with the ‘courage’ to disobey norms.

Figure 1 will be utilized when analyzing changes that have taken place regarding the Swedish moose management system. For example, it will be used to discuss how various organizations have bargained over changes in formal rules as well as how both organizations and individuals have altered their strategies after the new formal rules have been implemented. One such important rule applies to the establishment of MMUs.

**Rationality concept:**

In this thesis, individual actors engaged in moose management through MMUs are believed to be “rational.” The *rationality* concept rests on three basic assumptions: 1) an individual always wants more ‘utility’; 2) an individual has set preferences; and 3) an individual makes consistent choices (Hultkrantz & Nilsson, 2004). The rational individual is strategic and goal-oriented. One critique of this rationality concept is the assumption that individuals have complete information and the ability to process it; this, in reality, is hardly ever the case. Simon’s concept of bounded rationality takes this into consideration, as he claims that individuals also use their personal selection
criteria when there is incomplete information (Simon in Ostrom, Schroeder et al., 1993). Economic and psychological experiments have disclosed a variety of behaviors in addition to the self-interested actor. For example, many people seem to be conditional cooperators and are willing to contribute, as long as other people do so as well. People are also willing to punish those who do not contribute, even when it involves a cost for them to do so (Ostrom, 2000b). However, the “rational egoist” is very useful in predicting behavior in competitive market situations. In these settings, the actors are relatively autonomous and the time horizon for making decisions is short. However, in most situations, a mixture of actors will be found. Although actors like the “rational egoist” do exist in many settings, actors with strong norms of reciprocity are also often present; when communication is possible, this facilitates trust building (Ostrom, 2005:235). The problem of individual rationality versus collective rationality will be further discussed in the upcoming sections.

The most essential criticism of the concept of the rational individual questions the assumption that preferences are stable; this assumption is particularly ill-suited for explaining changes in norms and values (Alston, Eggertsson et al., 1996; Knight, 1992). However, Knight and Ensminger use a rational choice perspective when examining norm changes due to conflicts between various ideological preferences. Not all norms in a society govern economic behavior as some norms are motivated by nonmaterial preferences and ideological values (Ensminger & Knight, 2001).

In this thesis, the main empirical analysis will focus on aggregate individual rationality as it is assumed that two main interests are in conflict: hunting and forest sector interests. Landowners and hunters are assumed to be rational in the sense that they want more utility and have rather stable preferences regarding the management of the moose population. The landowner’s primary interest is forest production, which implies a preference for a smaller moose population; whereas the hunter’s primary interest is to ensure hunting opportunities, which results in a preference for a larger moose population. Thus, in order to answer the questions posed in this thesis, a “simplified” view of individuals as rational actors is productive.
**Methodological individualism:**

The question of how to explain social phenomenon, through a structural or individual perspective, is an ongoing point of discussion within the social sciences. The arguments for individual methodology are based on ontological, epistemological, and methodological considerations. The ontological view holds that social phenomena are created by individuals and made up of individuals. The epistemological thesis asserts that, because only individuals can be observed directly in society, all social knowledge has to be formulated from an individualistic perspective. Finally, methodological individualism is a normative stance that claims that social phenomena should be defined, explained, and reduced to laws about individuals (Udehn, 2002)—or as North states:

> Institutions are the creation of human beings. They evolve and are altered by human beings; hence our theory must begin with the individual. At the same time, the constraints that institutions impose on individual choices are pervasive (North, 1990:5).

North’s statement includes all three arguments. However, he emphasizes the affect of institutions (a social concept), so that his is not an “orthodox” view of methodological individualism as social phenomena have some kind of explanatory force. In their interpretation of institutions, March and Olsen emphasize structure over individuals; they consider routines to be the most important aspect of institutions (Peters, 1999). However, as Knight claims, this perception 1) fails to take into account the problem of conflicting roles; 2) removes human decision making; and 3) inhibits explanations for change (Knight, 1992; Peters, 1999). Yet even in mainstream empirical sociology it is common to use some form of methodological individualism (Nee, 2001). Coleman argues that, despite the fact that the emergence of norms must be explained on the basis of individual actions, once a norm is established, it is a system-level property that affects individuals (Coleman, 1994). Most scholars within institutional analysis rely on methodological individualism, with a view of individuals as rational actors.
Methodological individualism is employed to some extent in this thesis; however, as depicted in Figure 1, it is assumed that institutions affect individuals and, therefore, structure also has an explanatory value.

**The problem of collective action:**
The main objective for scholars within the rational choice paradigm has been to understand the collective action problem (Knight, 1992; Peters, 1999).

Unless the number of individuals in a group is quite small, or unless there is coercion or some other special device to make individuals act in their common interest, rational, self-interested individuals will not act to achieve their common or group interest. In other words, even if all of the individuals in a large group are rational and self-interested, and would gain if, as a group, they acted to achieve their common interest or objective, they will still not voluntarily act to achieve that common or group interest (Olson, 1965:2).

The focus has been on how to achieve outcomes that are socially efficient when a conflict arises between individual rationality and group rationality (Knight, 1992). “Social dilemmas occur whenever individuals in interdependent situations face choices in which the maximization of short-term self-interest yields outcomes leaving all participants worse off than a feasible alternative” (Ostrom, 2000a:473). This class of problems has been called the public-good problem, the free-rider problem, the tragedy of the commons, and the prisoner’s dilemma (Ostrom, 2000a).

Research in the field of social dilemmas has identified many exceptions to Mancur Olsson’s zero-contribution thesis; scholars also have been able to identify what types of collective action problems are associated with different types of goods, such as common-pool resources and public goods. In addition, modifications to behavioral assumptions have been highlighted as important in furthering the research in this field (Ostrom, 1990, 2000a, 2000b).

The problem of avoiding free-riding (receiving benefits without paying costs) has been labeled a first-order collective action problem in that it concerns how institutions are established. The problem of establishing a rule that induces contributions is called a second-order collective action problem and is a question of institutional design, such as
Ostrom’s famous design principles. The *third-order social dilemma* relates to the problem of rule enforcement, in that sanctioning involves a cost to the person carrying out the sanctions while everyone else receives benefits—even free-riders (Ostrom, 2000b). However, this problem is mitigated when a norm rewards the sanctioner’s sanctions. This second norm necessitates other people expressing gratitude toward people carrying out the sanctions (Coleman, 1994). In addition, the execution of sanctions toward people who do not punish those breaking the norms serves as an effective way to enforce norms. Axelrod uses the example of someone in the American south making a statement against a lynching and consequently being attacked—in other words, the individual failed to support the people enforcing the norm of racial violence and was thus punished (Axelrod, 1986)

Although moose are a rather mobile resource, harvesting rights are connected to properties that are almost always too small to facilitate sustainable resource utilization without cooperation among landowners. Therefore, the problem of individual versus collective rationality becomes apparent in the case of moose hunting. However, another reason is the fact that the establishment of MMUs has signified changes in the property rights structure. Therefore, a detailed review of the bundles of property rights as well as their implications on management strategies will be discussed in the next section.

### 2.2 Property Rights

Since the publication of Hardin’s article, “The Tragedy of the Commons,” considerable research has been conducted on the effects of diverse property right regimes over natural resources (Hardin, 1968; Libecap, 1993; Ostrom, 1990; Ostrom & Schlager, 1996). Although Hardin mistook the commons for open access, he highlighted difficulties in achieving collective rationality among a group of rational resource users without any rules (Hardin, 1968). Subsequent research demonstrated that most commons have rules restricting access and usage of the resource; therefore, the “tragedy of the commons” can be avoided (Ostrom, 1990). At the end of the 19th
century, the situation of moose populations in Sweden could be described as the “tragedy of the commons”; however, this situation changed due to—among other things—the establishment of rules that in part forced collective action among resource users.

When analyzing common-pool resources, four ideal and analytic categories are frequently used: open access (unrestricted usage), state property (held by a government that decides on access and use limitations), communal property (property held by a community whose members have equal rights of access and use), and private property. Private property signifies that individuals have the right to exclude other users and regulate the use of resources; these rights are generally recognized and enforced by the state. Ownership is also usually transferable and exclusive (Feeny, Berkes et al., 1990). All types of regimes are restricted in the use of the resource, except for open access. Table 1 provides a comparison of the four ideal categories regarding specific owner rights and duties.

Table 1. Types of Property-Rights Regimes with Owners, Rights, and Duties (Source: Hanna, Folke et al., 1996:5).

<table>
<thead>
<tr>
<th>Regime type</th>
<th>Owner</th>
<th>Owner rights</th>
<th>Owner duties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private property</td>
<td>Individual</td>
<td>Socially acceptable uses, control of access</td>
<td>Avoidance of socially unacceptable uses</td>
</tr>
<tr>
<td>Common property</td>
<td>Collective</td>
<td>Exclusion of non-owners</td>
<td>Maintenance; constrain rates of use</td>
</tr>
<tr>
<td>State property</td>
<td>Citizens</td>
<td>Determine rules</td>
<td>Maintain social objectives</td>
</tr>
<tr>
<td>Open access (non-property)</td>
<td>None</td>
<td>Capture</td>
<td>None</td>
</tr>
</tbody>
</table>

In addition to the fact that open access often leads to resource degradation, research has revealed that none of these are better than others at ensuring sustainability (Berkes, 1996:88). However, these categories are too “general” when analyzing specific property rights as they are much more complex. For example, property right regimes affecting the Sámi in Sweden are all of the above, in some form or other. The Sámi village territory functions as communal property as it is the community of the village that decides the rules for reindeer grazing. However, these rules cannot be socially
unacceptable, such as overgrazing resulting in degradation of the sensitive tundra due to state objectives. The Swedish state owns the land, while the Sámi have user rights that include not only grazing rights, but also hunting and fishing rights. In addition, individuals own the reindeers (i.e., private property) (Wennberg-DiGasper, 2003). Similar complexity applies to the Swedish MMUs.

The “ideal” relationship between property holders and the state is a fundamental societal question, as is determining how much legitimate control the state should be able to exert over property holders (Reeves, 1991:112). The Swedish Constitution states that private property is protected against expropriation by the state unless it is needed for the public good, in which case the property owner is compensated. Lane and Skogh argue that an asymmetry exists between individual property owners and public authorities as profits and losses are connected to the individual while authorities make many decisions on land usage. “During the present circumstances, the costs for environmental protection are randomly distributed over individual property owners with, in part, confiscatory methods” (Skogh & Lane, 1993). One example is when the Swedish state allowed the general public to fish with “manual” fishing gear in the archipelagos on the East Coast. Prior to this change, sports fishermen either had to purchase fishing permits or make agreements with the individual fishing rights holder. Minimal financial compensation was paid out to the fishing rights holders (Skogh & Lane, 1993: 167 - 171). However, when Sweden signed the European Convention (SFS, 1994:1219) on Basic Human Rights and Freedoms, a stronger protection of private property was enacted. The Swedish Public Administration Supreme Court (Regeringsrätten) has tried a number of cases, and praxis has developed the proportionality principal. This implies that the individual landowner’s interest should be balanced against the public interest when judging whether infringement of property rights is justified (Prop. 1999/2000:73:29).

Rules are created on three distinct levels: constitutional, collective choice, and operational choice. Operational rules are the day-to-day rules: “They are the set of rules to which participants would refer, if asked to explain and justify their actions to fellow participants” (Ostrom, Walker et al., 1993:39). When a hunter decides to shoot a
moose, the decision is made on the operational level. *Collective choice rules* are made in two arenas—namely, the formal and informal. Formal collective choice rules are decided in legislatures, regulatory agencies, and courts at the national, regional, and/or local levels (Ostrom, Burger et al., 1999:61). Collective choice rules are made by officials to determine, enforce, or alter action authorized within institutional arrangements. A key attribute of this level is that officials have the authority to impose sanctions. Collective choice rules affect operational activities and results by determining who is qualified to participate as well as the specific rules to be used in changing operational rules (Ostrom, 1990:52). The informal collective choice arena is made up of informal gatherings, private associations, and appropriation teams (Ostrom, 1990:61). Finally, *constitutional choice rules* directly affect the collective choice level (Kiser & Ostrom, 1982:208). Property rights are constitutional choice rules and therefore critical in the sense that these affect the collective choice level rules and in turn operational rules. In addition, constitutional choice rules are usually more difficult to alter as they are also often part of a country’s constitutional law. One consequence is that, if property rights are contested, difficulties in establishing rules on the other two levels are implied. Table 2 provides a breakdown of what property rights contain.
Table 2. Bundles of Rights Associated with Position (Source: Ostrom, 2003).

<table>
<thead>
<tr>
<th>Right Type</th>
<th>Full owner</th>
<th>Proprietor</th>
<th>Authorized claimant</th>
<th>Authorized user</th>
<th>Authorized entrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access, i.e., [The right to enter property]</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Withdrawal, i.e., [The right to extract resources]</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Management, i.e., [The right to regulate usage patterns]</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Exclusion, i.e., [The right to decide access and how to transfer the right]</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Alienation, i.e., [The right to sell or lease Management rights and/or exclusion rights]</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Property rights refer to the relationship between people with regards to some object. This implies that one person’s right includes another person’s obligation to respect that right (Ostrom & Schlager, 1996). The most basic rights are rights to access and withdrawal of resources. Management rights are defined as the right to organize usage patterns; this includes where, how, and when the appropriation of a resource can take place. To possess management rights also means that it is possible to make decisions regarding improvements of the resource. These are collective choice rules; depending on the institutional arrangement, they can either be decided by the public administration or by informal gathering or associations. Exclusion implies that the person holding the right can decide who will have access, while alienation is defined as the right to sell or lease out the management rights and/or exclusion rights (Ostrom, 2003). These rights can either be held individually or by collectives. The vital difference between access and withdrawal rights versus management rights, exclusion rights, and alienation rights is that the last three mean that the property rights holder can make decisions about future rights. In other words, in order to provide incentives
for resource users to invest in resource management, it is critical that they have at least management and exclusion rights (Ostrom & Schlager, 1996).

Private property rights are restricted in Sweden through “Allemansrätten” (everyman’s right), which permits public access to private property—a right that also includes the right to pick berries and mushrooms. Consequently, every person is an authorized entrant on private property in Sweden. Hunters who lease hunting rights can be characterized as authorized users because their withdrawal rights are specified; they cannot make management decisions and they have no exclusion or alienation rights. Hunters who lease hunting rights are like everyone else who hunts: restricted by a number of formal rules, such as the hunting period, hunting license requirements, and so on.

Until 1938, landowners could be considered full owners with all the rights described in Table 2. However, in 1938 the state passed legislation to promote cooperation among landowners regarding moose hunting (which will be discussed further in Chapter 6); the most recent law, the Wildlife Management Area (WMA) law, regarding cooperation among landowners was enacted in 2000 (SFS, 2002:259). This legislation entailed a certain degree of forced collective action as landowners could be forced to join the WMA under specified circumstances. When Sweden signed the European Convention for Basic Human Freedoms and Rights, private property rights were strengthened. The argument in the bill preceding the latest WMA law was that the public interest of coordinating moose hunting justified infringement on private property rights due to the significant impact that hunting has on the moose population (Prop. 1999/2000: 73:29-31). However, in line with these strengthened property rights, the new WMA law includes more stringent rules regarding the degree of forced enrollment of landowners and concerning the right of the association to make binding decisions for its members (Prop. 1999/2000: 73). The management rights of each WMA are restricted because CAB decides the number of moose that can be shot. However, the WMA still can choose to shoot fewer moose than its allotted quota (SOU, 1997:69 91:336). Meanwhile, landowners have

8 Allemansrätten is regulated in Swedish constitutional law; it provides the public with the right to access private property (RF 2:18).
alienation rights as they can sell their property or lease out hunting rights. However, the WMA association can regulate landowners’ exclusion rights, deciding the minimum number of hectares required for a hunting certificate. Landowners receive hunting certificates proportional to the size of their piece of property. However, landowners with fewer hectares than specified by the association cannot lease out their hunting rights. Many decisions in WMAs are made collectively, such as the decision to hunt on all land in the WMA (Prop. 1999/2000:73).

What changes in property rights have occurred as a result of the possibility for hunting rights owners to establish MMUs? The potential to establish MMUs has resulted in increased management rights for hunting rights owners as now they can decide how many moose to shoot. The importance of deciding the number of moose to shoot relates to the considerable impact that hunting has on the moose population; approximately one third of the moose population is decimated during the hunting season. It is impossible to control a small-game population in the same manner because the impact of hunting is much smaller (SOU, 1990:60:27). In other words, when analyzing management rights, it is important to realize that a qualitative perspective exists that depends upon resource characteristics. The importance of management rights is, in part, dependent upon the impact that the harvesting of the resource has on the population. The decision to open up the possibility for landowners to establish MMUs meant that the formal prerequisites for local resource management system were in place. The extent to which such a system has been established will be discussed later. Here it can be concluded that such a change would also require institutional changes. What would that imply? The next section will introduce theories of institutional change.

2.3 INSTITUTIONAL CHANGE

How, then, do institutions develop and change? Three theories of institutional change have been proposed: social convention theory, market-based theory, and the bargaining theory.
Most rational-choice theories of institutional emergence and change employ some model involving a game with multiple equilibriums. Related to each equilibrium is an institution (rule of action) that would, if selected, resolve the strategic problem inherent in a situation in which there are a number of ways of doing something and the task is to establish a common way of doing it (Knight, 1995:96).

The social convention theory assumes that institutions evolve arbitrarily and that the only institutional changes that are made are those that are Pareto improving—i.e., at least one individual will increase his utility and no one’s utility will decrease. The institutional change will gravitate toward some salient resolution (Knight, 1992). Basically, anything in the context that can provide a focal point will be chosen to achieve coordination. This theory of institutional change, therefore, is most fruitful when no distributional consequences arise in the different equilibrium rules (e.g., when deciding whether to drive on the left or right side of the road) (Ensminger & Knight, 1997). Since the question of moose management in Sweden is conflict filled and decisions regarding the size of the moose population clearly have distributional consequences, the social convention theory would not have sufficient explanatory power.

The market-based theory also assumes only Pareto-improving institutional change regarding decentralized institutional change. However, formal institutions are not believed to be socially efficient; rather, they serve the interests of actors with the greatest power and may very well be socially inefficient (North, 1990). In other words, formal rule changes might be Pareto-improving, but this depends upon what the interests of the actors are as well as their relative bargaining strength. The market-based theory employs two mechanisms for explaining institutional change: the voluntary contract and competition. The basis of the market-based theory is a market with competing actors trying to contract with each other. The choice of contracts will be affected by the relative transaction costs (the costs for establishing a contract *ex ante* and *ex post*) related to each alternative (Knight, 1995:107). Actors will choose what is best for them, but the pressure of competition is the mechanism ensuring Pareto-improving institutional change. A high degree of competition will ensure that the bargaining power of individual actors will not determine the outcome as competition
acts as an equalizer (Knight, 1995). However, when transaction costs are high, Pareto-improving changes may not take place (Knight & North, 1997). Regarding centralized institutional change, North and Libecap have asserted that competitive situations are often thwarted due to differences in the strength of various organized interests. According to Knight, this view of the affect of distributional consequences on decentralized change has not been pursued, despite the fact that many informal rules, such as gender, produce asymmetries (Knight, 1992). The situation regarding moose management in Sweden cannot be described as being characterized by high competition—in other words, it cannot be likened to a market situation; therefore, the market-based theory will not be fruitful for analyzing changes in the moose management system.

The bargaining theory is based on other logic. It assumes that social institutions are the by-product of strategic conflict over substantive social outcomes (Knight, 1995). In other words, the difference between the bargaining theory and the other two theories is that the mechanism for change is strategic conflict among actors. The resolution of the bargaining often is achieved due to asymmetries in resource ownership.

The people of the institution-free Hobbesian world have equality of bargaining power, but no social order. In a world endowed with institutions that resolve societal conflicts, there is social order but unequal bargaining power and unequal access to coercive resources (Levi, 1990:402).

Thus, the stability of institutions is explained by their ability to provide benefits to the most powerful actors (Knight & Sened, 1995). Coleman distinguishes among beneficiaries and targets of norms, suggesting that a certain class of actor whose actions are being controlled are targets while beneficiaries are those actors who benefit from the norm (usually the potential sanctioners). Disjoint norms are norms by which the beneficiaries and the targets are two distinct sets of actors; conversely, for conjoint norms each actor is simultaneously the beneficiary and target of the norm. The reason that disjoint norms can be enacted by beneficiaries is that they have power over the targets. In addition, not only do powerful actors have the potential to establish disjoint norms,
they can also more easily avoid sanctions regarding conjoint norms because these sanctions are costly for the person carrying out the sanctions, making them less likely to be enacted if the transgressor is powerful (Coleman, 1994).

Even if all actors suffer when they cannot establish institutions to solve coordination problems, some can better afford not to solve coordination problems due to greater resources. If some actors have power over other actors due to, for example, greater resources, they will opt for a rule that will ensure that their share is as large as possible and will consequently have the bargaining power to establish their preferred institution. Power can be defined as the ability of individuals with greater resources to affect other individuals’ alternatives. Depending on the context, various resources, such as knowledge, money, and status, can increase an actor’s power (Knight, 1992). The relative distribution of rights and resources in a given context affects the level of power various actors have. Moreover, when great differences exist, this facilitates groups with more power establishing norms that control the actions of those with less power. The powerful group also has the tools to ensure that the norms are enforced (Coleman, 1994). However, another angle of power relations in society exists, as does its affect on the establishment of norms in a society. This aspect deals with the fact that the establishment of formal versus informal rules depends on who wants to ensure that their interests are met.

Throughout history, in fact, the limitations on power which the subordinate have been able to secure, and which they understand as constituting rights for themselves, have usually been conventional rather than legal in form, in contrast to the rules securing the power of the dominant (Beetham, 1991:67).

Greater resources permit an actor to better afford extended bargaining and perhaps threaten other actors. Consequently, their influence in the bargaining situation will be stronger than that of actors with fewer resources (Knight, 1992). However, not only the volume of the resources is of importance, but also how critical the various kinds of resources that actors have will affect the bargaining situation. The bargaining theory does not presuppose that an institutional change will be Pareto-improving, although this might very well be the case (Knight, 1992). The focus is on the eventual
distributional consequences of choosing among rules that all ensure coordination. When rules generate unequal distribution, the primary mechanism for change is bargaining among actors (Knight, 1992). Sometimes, it is clear that assorted rules produce unequal distributions. At other times, it may be harder to judge what consequences a new rule will generate.

The bargaining theory can be utilized to analyze MMUs because a diverse landowner structure might affect the choice of rules regarding moose management. For example, MMUs owned entirely by forest companies are likely to have an interest in ensuring a small moose population, whereas hunters leasing hunting rights do not have any incentives to establish a small moose population. Their interest is hunting and, contrary to forest companies, they do not have to pay the costs for a large moose population, which causes grazing damages and thereby diminishes the returns from lumber production. Both the hunters and the forest industry need to achieve some kind of cooperation, but presumably several equilibriums exist with clearly distributional effects. The size of the moose population can be at several equilibriums, yet still within the biological carrying capacity. Therefore, it is important for MMUs to establish institutional rules that ensure their goals. According to the bargaining theory, the actors with the greatest resources have the power to ensure that the rule that most benefits them will be implemented.

Knight points out that, when choosing between theories of decentralized change, the bargaining theory is most suitable when distributional consequences of the rules exist. When private landowners establish an MMU, the conflicts between forest production and hunting interests should not be as great as when a forest company is the single owner of the MMU. One earlier investigation revealed that 59 percent of private landowners (in three counties with grazing damage deemed unacceptably high by the forest sector) considered the moose populations to be of appropriate size while only 7 percent considered the moose populations too large (Fällman, Ligné et al., 2005).

Under what conditions does decentralized or centralized institutional change occur, according to the bargaining theory? Changes in informal rules can take place if
the relative bargaining power of the actors changes or if the distributional consequences of rules changes. External effects (changes in technology, demographics, and so on) or unanticipated effects of rules can generate change (Knight, 1992). When striving to achieve institutional change, if the relative bargaining power of actors changes, the problem of solving the collective action problem within the group remains. Changes in formal institutions can be viewed as a bargaining process between the state and powerful interest groups. The state actors are either politicians or administrative officials, and their interests are direct (administrative costs of enforcing formal rules) or indirect. The indirect interest of the state is to ensure revenues as well as stay in power. Whether or not the state will implement more socially efficient rules depends upon what groups of actors ensure the interests of the state, either materially or through electoral support (Knight, 1992). Libecap argues that historical path dependences determine the current institutional framework and, consequently, what actors are involved, their relative bargaining strength, and their desire to preserve the status quo. The institutional path dependency’s constraint for institutional change is an empirical issue according to Libecap (Libecap, 1993). It is reasonable to assume that corporate arrangements in a policy field, for example, exhibit stronger path dependencies than those characterized by pluralism due to the fact that certain interest groups gain official recognition and thereby can secure greater bargaining strength. This in turn would imply more difficulties in achieving institutional change if strong actors’ positions are diminished by a proposed institutional change.

Informal rules, as previously mentioned, show remarkable stability, despite efforts to replace informal rules with formal rules; they can be explained by the fact that changing an institution necessitates changing existing social expectations.

To be successful, the new rule must cause social actors to shift their probability estimates to the strategies associated with that equilibrium. But unless an actor is confident that the new rule will be recognized and applied by those with whom he interacts, there is no reason for him to change his probability estimates (Knight, 1992:185).

An actor might not believe that the new rule will be recognized and followed for numerous reasons. People who have followed a certain rule all their lives might be
unwilling to change their actions, despite the fact that this refusal to follow a new rule might incur a cost to them. In addition, ideological views might compel people not to follow new rules, despite the cost. However, one additional difficulty in establishing new formal rules is that the new rule might be subject to various interpretations and, therefore, might fail to provide the same critical information to all who are subject to the rule. Yet another reason is the risk that sanctions under the new rule will not be effectively implemented (Knight, 1992: 185-189). When it comes to moose management, good monitoring is essential, but this activity is also governed by rules. For example, in smaller communities it is easier to monitor and sanction non-compliance with informal rules than formal ones because social interactions are extensive, intensive, and long-lasting. Another problem might be that sanctions are not appropriate for the deviation of rules. One of Ostrom’s design principles emphasizes the importance of graduated sanctions, which indicate that the severity of sanctions should gradually increase (Ostrom, 1990). Furthermore, this is a matter of management.

The diverse theories and concepts of institutions will be utilized throughout the thesis in order to examine the complex institutional context. For example, the interaction among formal and informal rules and why certain formal rules do not lead to intended consequences will be discussed. The bargaining theory will be utilized to analyze institutional changes in the Swedish moose management systems.

As this chapter has discussed, the possibility of establishing MMUs has meant that hunting rights owners have gained management rights, which are deemed critical for the emergent of adaptive co-management systems. One aim of this thesis is to evaluate to what extent MMUs can be characterized as adaptive co-management systems. In the next chapters, the concepts of adaptive management and adaptive co-management will be discussed thoroughly.
The first question posed in this thesis focuses on to what extent Swedish MMUs can be characterized as adaptive co-management systems. This chapter presents central concepts that underlie adaptive management and adaptive co-management. As previously mentioned, it is critical to distinguish between adaptive management and adaptive co-management as these presumably require radically different institutional frameworks. However, both of these approaches are based on the same theories and utilize the same basic concepts regarding ecosystems and their functions. The main theoretical concepts are ecosystem complexity, resilience, and adaptive renewable cycle. A key factor in the adaptive management approach is that the management system should not alter the ecosystem, but accept the dynamics as well as the “surprise” element and respond appropriately. In practice, it signifies accepting the unpredictable features of ecosystems and accepting the limitations of human intervention in controlling ecosystems (Berkes, 1998).

There is a lack of systematic comparisons of the institutional arrangements necessary to implement these two approaches, which should not be seen in an either-or light. Both stem from the same concepts and have major contributions to make with respect to the management of natural resources. Thus, the aim is not to cast judgments on the relative merits of the two lines of research. Nonetheless, it is conceived that future research will benefit from this distinction as it will allow for more focused and productive questions that can better relate the approach to current management practices—be it in developing or developed countries. In addition, policy
makers need to be aware of the differences between these two approaches, as each necessitates diverse institutional arrangements, if they wish to implement either approach. For example, a conversion from a conventional resource management system to an adaptive co-management system is more radical than a conversion to adaptive management. In addition, as local appropriators play such a critical role in adaptive co-management, their interests and incentives to engage in management activities also determine whether this kind of system can be successfully implemented.

This chapter begins with a general introduction to several important ecological research findings and concepts as well as how these relate to the two approaches. Thereafter, adaptive management will be discussed with a focus on points such as scale, stakeholders, the public administration, learning, and implementation problems. A discussion of adaptive co-management and characteristic features of this approach will follow. Thereafter, a comparison between adaptive co-management and conventional resource management will be conducted in order to elucidate the manifold demands these place on the organization and tasks of the public administration. Finally, a systematic comparison between the adaptive management and adaptive co-management approaches will be presented.

**Ecological Concepts:**

In many countries, the management of natural resources has largely been controlled by governments and central agencies. There has been a belief and trust in scientific solutions to ecosystem problems among not only scientists, but also the general public. World views assuming that people are alienated from ecosystems have been prevalent (Folke, Pritchard et al., 1998). However, major crises in ecosystems are occurring more frequently, and there is increased realization of the global nature of many environmental problems, such as the global warming effect. Even resources such as fish are disappearing right in front of us, as evident in the near extinction of cod in the Baltic Sea, for example. There is a frantic search for new ways to manage natural resources in a sustainable manner.
Numerous problems caused by conventional resource management have stemmed from the view of ecosystems as controllable by humans. In this thesis, the following definition of an *ecosystem* will be used: “An ecosystem consists of plants, animals and microorganisms that live in biological communities and which interact with each other and with the physical and chemical environment, with adjacent ecosystems and with the water cycle and the atmosphere” (Odum in Folke, Pritchard et al., 1998:4). In conventional resource management, the environment is believed to consist of separate resource units that can be extracted, according to calculations of maximum sustainable yields, to achieve constant yields without depleting the resource (Berkes & Folke, 1998). This management concept is based upon the assumption that ecosystems are linear and predictable. However, research has shown that ecosystems are complex and possess attributes such as non-linearity, uncertainty, and self-organization (Berkes, 2003b).

**Resilience:**

Conventional resource management is often successful in the short term because it usually treats single variable problems, such as fires, pestilences, floods, or droughts that can be “solved” by means of scientific methodology. However, natural disturbances are crucial for the development and resilience of an ecosystem (Holling et al. in Folke, Pritchard et al., 1998). Management efforts to control single variables are made to decrease uncertainty and increase investments (Berkes, 2003b:19). This approach has been called *management pathology* because it evokes increasing human dependence on an ecosystem while simultaneously undermining the ecological system (Gunderson & Holling, 2002). Conventional resource management practices have often caused ecosystems to slip into a degraded state due to the loss of *resilience* (Holling & Sanderson, 1996:7-8), which can be defined as a system’s ability to maintain its basic structure and patterns of behavior after disturbances (Holling 1986:296). When an ecosystem has low resilience, drastic shifts can change it irreversibly. In doing so, an ecosystem threshold is reached, but it is difficult to predict when this is going to occur, especially as thresholds move over time (Folke, Carpenter et al., 2002:8). For example,
research on coral reefs and forests has disclosed that ecosystems often respond drastically to gradual changes. Studies on the effects of added nutrient concentrations into lakes, for example, have demonstrated that there is no apparent effect until a certain threshold is reached, after which clear water turns into turbid, eutrophied water (Folke, Carpenter et al., 2002:28). Sometimes these equilibrium shifts are permanent, as with desertification; at other times, they are periodic, as with outbreaks of forest pests (Folke, Pritchard et al., 1998:7).

The Ecosystem Cycle:
The ecosystem cycle consists of four phases that are active during several time periods: the exploitation phase, conservation phase, release phase, and reorganization phase (Holling & Sanderson, 1996:21). The exploitation and conservation stages reflect fairly stable conditions (Olsson, Folke et al., 2004:27). In the exploitation phase, new species are established; in the conservation phase, nutrients and the biomass are consolidated. Exploitation is represented by those ecosystem processes that are responsible for rapid colonization of disturbed ecosystems and during which organisms capture easily accessible resources... Connectedness and stability increase during the slow sequence from exploitation to conservation and a “capital” of biomass is slowly accumulated (Folke, Pritchard et al., 1998:6).

In the climax state, the system is “mature” for environmental disturbances, such as fire, disease, or insect pest outbreaks. In the release phase, natural disturbances like fires can occur—often very rapidly (Berkes, 2003b:18). The adaptive renewable cycle discloses the importance of not preventing “natural disturbances” affecting ecosystems. Many traditional societies allow disturbances to occur at a local level so as to prevent subsequent centralized disturbances (Folke, Colding et al., 2003:356).

Resilience research has emphasized that certain plants, animals, and biotic processes provide the basis for all other life “forms” and, consequently, should be focused on (Gunderson, Holling et al., 1995:26-28). Research also indicates that the stability of an ecosystem depends upon slowly changing variables, such as soil properties and biomass of long-lived organisms (Carpenter, Scheffer et al., 2001). Diversity is crucial in the ecological system in regards to the function of a species (for
example pollinators and predators) and the diversity of the species. Diversity acts as insurance against drastic changes in the ecological system, and certain organisms or species have critical functions (Folke, Carpenter et al., 2002:25-27). If the resilience of an ecosystem declines, it becomes vulnerable to both human-induced and natural disturbances. The ecosystem cycle shows that disturbances are an important part of the system. However, if an ecosystem’s resilience declines, even natural disturbances become a threat to the ecosystem. Research in this field has also disclosed difficulties in determining thresholds, which is troublesome—especially as alternative states of ecosystems can be very expensive or even impossible to reverse and can have far-reaching consequences.

The above-described concepts form the basis of the adaptive management approaches. The importance of diversity, for example, can be dealt with by applying an ecosystem perspective instead of only focusing on single species or “problems.” The importance of not preventing natural disturbances in an ecosystem also is highlighted by applying an ecosystem perspective. The limitations of traditional biological and ecological science in dealing with complex non-linear systems, such as ecosystems, have resulted in an emphasis on conducting experiments in the adaptive management approach. In addition, the complexity of ecosystems has resulted in an emphasis on learning in the adaptive management approach. Both adaptive management and adaptive co-management adhere to the above-described concepts and theories. However, the institutional prerequisites for each are significantly different, as will be discussed in the following sections.

3.1 WHAT IS ADAPTIVE MANAGEMENT?

This section begins with a general introduction to the adaptive management approach, followed by a description of the implications of the approach regarding scale, stakeholders, knowledge, learning, and finally implementation problems. An interdisciplinary team of biologists and system analysts defined the approach in the mid-1970s, and the approach and closely linked concepts have since gained
recognition. This, in turn, has led to an increase in related research. Holling, Walters and Gunderson have made substantial contributions to the centralized line of research (Gunderson, Holling et al., 1995; Walters, 1997). Walter’s definition of the approach is stated in the following way: “Implementation of experimental management policies that attempt to balance short-term social, ecological, or economic risks with possible longer benefits due to increased knowledge of system properties” (Walter in Jones, 1998:33). Although this approach is linked closely with larger-scale experiments, which recognize surprise, it relies heavily on “traditional” biological/ecological science (Gunderson, Holling et al., 1995; Lee, 1993).

Scale:
Most deliberately installed adaptive management systems can be found in Canada, Australia, and the United States, predominantly in geographically-large ecosystems and on state-owned land. Lee claims that “…adaptive management appears to be a ‘top-down’ tool, useful primarily when there is a unitary ruling interest able to choose hypotheses and test them” (Lee, 1999:18). Although not all efforts in implementing adaptive management have taken place in geographically large ecosystems, such as the Everglades and the Columbia River Basin, most have. Gunderson pointed out that it is necessary to have “space” for taking measures in the social and resource systems (Gunderson, Holling et al., 1995:19) and that small-scale experiments are unproductive as they are neither recorded nor efficiently communicated (Gunderson, 1998:43). One argument for large-scale implementation of the adaptive management approach is that biologically effective preservation of species and habitats requires larger areas (Lee, 1999). An example where this approach has been implemented in a geographically smaller ecosystem is in Ontario’s inland fisheries. The cost of the adaptive management approach was justified by formulating questions regarding important species from separate lakes in the area; in other words, the results would be applicable to other lakes as well. Ontario’s fishery managers formulated questions they considered important, such as the effect of open-access fishing on the fish population and how trout would react to the loss of its traditional habitat. These questions were
tested by conducting experiments in three different lakes. One result was the discovery that trout were capable of finding substitutes for losses of habitat (Fruetel, 1998). However, experiments like this would be difficult to implement in lakes in which people have private fishing rights. Most people would probably be reluctant to permit their fishing waters to undergo experimentation for the “greater good.” In addition, environmental organizations or societies arguing for the prevention of cruelty to animals might not be pleased with experiments like those described above.

**Stakeholders:**

Although there seems to be consensus regarding the importance of close cooperation between resource managers and scientists, this is not the case with respect to the degree of involvement of stakeholders. Lee stresses the importance of some kind of prior agreement with stakeholders before the adaptive management approach is implemented as conflict is always present (Lee, 1999). Stakeholder involvement in these processes can reveal diverse views of deeply held ecological beliefs and values between various interests, such as “development” interests and environmental interest groups (Walters, 1997). However, scientists have divergent views regarding to what degree stakeholders should be involved in the process. It seems that most researchers realize that stakeholders will become involved if the questions affect them. However, there is a concern regarding stakeholders’ lack of scientific knowledge. Currently, stakeholder involvement in natural resource management seems to be the norm, and stakeholders’ relevance in the process is highlighted in many political documents and laws. For example, the European Committee’s Watershed Directive highlights the involvement of communities in the establishment of watershed management plans and in reviewing these (Directive 2000/60/EC). Gunderson expresses concerns about replacing uncertainties in ecosystems with institutional processes, such as community-based management systems by which science gets thrown out (Gunderson, 1998). In order words, he issues a warning against institutional structures that end up neglecting important parts of the adaptive management approach.
**Public administration:**

The technical challenge of the approach is to create a framework in which participants formulate alternative testable hypotheses and then make a choice between these hypotheses (Gunderson & Holling, 2002:414). Thus, it is important that managers are familiar with science and have the capacity to understand new scientific findings (Carpenter, 1998). The resource managers also have to function as leaders as they have to motivate the involved parties to gather information (Lee, 1999). One decisive problem is making public resource managers accept risks and conduct experiments instead of striving for reliability and the reduction of surprises, as is the practice in conventional resource management (Danter, Griest et al., 2000:539). In addition, the current academic structure discourages team efforts and experiments because promotions are based upon numerous rapid publications, a requirement that is not consistent with long-term studies and cross-disciplinary efforts (Carpenter, 1998). Depending on a country's natural resources, public management structure, and the employees' educational background, the implementation of adaptive management might differ between countries. A public administration whose focus is on natural science rather than law will probably facilitate the implementation of adaptive management.

**Learning:**

One basic feature of the adaptive management approach is the importance of continuously learning about ecosystems. Conventional resource management exhibits major flaws in this regard. Research has disclosed that no efforts have been made to document the past decades of professional experience of resource managers and that policy failures were not even noted (Hillborn in Ostrom & Janssen, 2002:9). One of the major challenges is to develop the capacity for learning among resource managers, which seems to be enhanced when the focus is on understanding in networks, with several individuals collaborating. It also is necessary to facilitate learning among actors other than technical experts in the process. One momentous obstacle to encouraging learning is the short political cycle as it does not promote long-term projects.
(Carpenter & Gunderson, 2001). However, if learning is to become a key guideline of the public administration related to natural resource management, the view of public administrators as experts has to be altered and gain legitimacy among the public and other concerned interests.

**Implementation problems:**

Some of the problems regarding the implementation of adaptive management relate to high monitoring costs as experiments usually require monitoring of a wide range of variables; some of these variables might be quite expensive to monitor, such as trends in rare and endangered species and primary production. Another problem involves the risks to which sensitive species might be exposed during experiments. Other obstacles impeding implementation of the approach can be attributed to the existing scientific paradigm, political inaction, and fundamentally diverse ecological values between environmental interest groups and “development” interests (Walters, 1997). After a major crisis in ecosystems, institutions are generally more “open” to implementing changes, such as the adaptive management approach (Danter, Griest et al., 2000; Gunderson, 2001). In other words, it might become a “last resort” approach when ecosystems experience significant crises that cannot be “handled” in a traditional manner. One institutional change that could improve the potential for the adaptive approach is flexible legislation that explicitly permits experimental management (Jones, 1998:45). This is quite a radical suggestion in many ways. National governments would have to admit the inability of centralized agencies to ensure the sustainable use of natural resources with state-of-the-art scientific findings. The basis of traditional top-down management of natural resources is the capacity of the scientific community and central agencies to “solve” emerging problems. A crucial part of the adaptive management approach is to learn from mistakes; thus, it becomes necessary to document failures, which poses political risk (Lee, 1993:53).

To summarize, adaptive management as well as conventional resource management is implemented via a top-down structure, in which the role of the local resource users is limited. However, one difference is that adaptive management focuses
on learning about ecosystems by conducting experiments and does not rely only on traditional biological and ecological science in managing natural resources, as is the case with conventional resource management. The notable emphasis on cooperation among scientists and public resource managers requires changes in current academic and administrative structures. Perhaps the greatest obstacles in implementing the adaptive management approach are its long-term view and the fact that it emphasizes learning rather than generating quick-fix solutions, neither of which politicians wants to invest in due to the short political cycle.

The next section will discuss the adaptive co-management approach.

### 3.2 Adaptive Co-Management

One aim of this thesis is to investigate to what extent MMUs are adaptive co-management systems. Therefore, the adaptive co-management approach will be discussed in this section, beginning with a general introduction. Thereafter, manifold aspects of adaptive co-management systems will be described, including local ecological knowledge, ecosystem management, monitoring, and learning. Each description concludes with a criterion in order to determine whether MMUs fulfill these criterions and as a result can be characterized as adaptive co-management systems. Thereafter, the role of the state in adaptive co-management will be discussed.

Carlsson and Berkes define co-management as “…a continuous problem-solving process, rather than a fixed state, involving extensive deliberation, negotiation and joint learning within problem-solving networks” (Carlsson & Berkes, 2005:65). The literature provides strong emphasis on the process perspective of co-management and adaptive co-management (Carlsson & Berkes, 2005; Olsson, Folke et al., 2004; Plummer & FitzGibbon, 2004). Central conditions necessary for creating adaptive co-management and building resilience of social-ecological systems are believed to include the following: 1) vision, leadership, and trust; 2) the enabling of legislation that creates space for ecosystem management; 3) funds for responding to environmental change and for remedial action; 4) the existence of monitoring and
adequate response to environmental feedback; 5) information flow through social networks; 6) the combination of various sources of information and knowledge; 7) sense-making for ecosystem management; and 8) arenas of collaborative learning for ecosystem management (Olsson, Folke et al., 2004). It is not easy to accomplish all the above enumerated factors. For example, a recent network study of a Swedish fishing association shows that the reason for the divergence between rule-setting and the perception as to the state of the ecosystem was the lack of cooperation between anglers and the fishing board association due to the fact that anglers did not own property and therefore did not have voting rights at the board meetings (Sandström, 2008).

This thesis does not focus on the process aspect of the adaptive co-management concept, but rather on its measurable outcomes (e.g., the ability of resource users to meet stated management goals, the existence of monitoring, application of ecosystem management, and the existence of linkages between geographical and organizational levels). Prominent scholars who advocate such an approach (e.g., Folke, Berkes and Colding) rely on theories regarding ecosystems as complex systems. Concepts like resilience, thresholds, and so on are integrated into social notions such as institutions, particularly property rights (Folke, Pritchard et al., 1998:14). The realization that ecosystems are inseparable from social systems has led to influences from common pool resource (CPR) studies and institutional theories as these focus on rules that govern the management of natural resources. Common pool resources are goods characterized by the fact that it is difficult not only to exclude potential appropriators, but where joint use is also subject to subtractability—that is, when one person deducts units from the resource, it adversely affects other users’ ability to use that resource. “The key fact of life for co-appropriators is that they are tied together in a lattice of interdependence, as long as they continue to share a single CPR” (Ostrom, 1990:38). A general problem with CPRs is that, if everyone is acting in a logical, rational, short-term way, this will lead to the destruction of the “commons”. Therefore, an important feature of the management of CPRs is to ensure sustainability of the resource system through organized collective action of its resource
users (Ostrom, 1990). Major focus has been on traditional societies and how these have managed to build social-ecological resilience. As many traditional societies have managed to adapt to an ever-changing environment, proponents of the adaptive co-management approach argue that it is possible to gain insight into what contributes to resilience building in both social and ecological systems.

Traditional systems parallel adaptive management in their reliance on learning-by-doing, and the use of feedback from the environment to provide corrections for management practice. They differ from science-based systems generally by the absence of testable hypotheses and generalizable theories, and by the integration of moral and religious belief systems with management (Gadgil et al. in Holling, Berkes et al., 1998).

Certain management practices, based on ecological knowledge, have been identified as increasing resilience, including the monitoring of changes in the ecosystem and in resource abundance, total protection of certain species as well as the protection of specific habitats, temporal restrictions on harvesting, integrated species management, and resource rotation. The accumulation and transmission of ecological knowledge, cross-scale institutions, and mechanisms for cultural internalization promote management practices’ increasing resilience (Folke, Pritchard et al., 1998:418).

The most decisive institutional prerequisite for adaptive co-management is that local resource users should have an opportunity to participate in the management of natural resources. “Promoting resilience means changing, in particular the nature of decision-making to recognize the benefits of autonomy and new forms of governance in promoting social goals, self-organization, and the capacity to adapt” (Adger, 2002/2003:2). Facilitating the development of local resource systems requires rules that allow for this to take place.

Local natural resource management systems have some advantages over centralized ones. Local institutions can more easily obtain information at lower transaction costs and establish rules appropriate to local conditions (Hanna, 1998; Ostrom & Schlager, 1996). Research in this field has proven that local-level institutions respond faster to changes in the ecosystem than centralized agencies (Davidson-Hunt & Berkes, 2003:67). It is common for local resource users to detect
changes in the ecosystem (Olsson & Folke, 2001). “Systems of property rights and rules defined, implemented and monitored, and enforced by resource users are likely to perform better than systems of property rights and rules defined, implemented and enforced by an external authority” (Ostrom & Schlager, 1996:146). Resource users are more successful than external authorities in defining, implementing, monitoring, and enforcing rules for several reasons: 1) their knowledge of the physical environment stem from daily harvesting activities; 2) the rules match the social and cultural environment; and 3) the costs of monitoring and enforcing rules are lower (Hanna, 1998; Ostrom & Schlager, 1996).

In addition to having knowledge of the ecosystem, resource users also know people living in the area and what norms exist. Knowledge of norms pertaining to resource management is crucial as people might continue to adhere to norms even if formal rules contradicting them are implemented. Another point of view to consider is that local appropriators are more likely to be able to draft rules that contribute to reciprocity and high levels of trust among appropriators than public officials who lack knowledge of the characteristics of the community and its norms (Ostrom, 2005:281).

One problem with the adaptive co-management approach could be that people are not motivated to engage in natural resource management. Private property rights, including management rights, might provide incentives for local appropriators to engage in the management of natural resources. However, if there is no interest among local resource users in managing ecosystems, the whole idea collapses. Another important aspect is that the system has to include more than just a few resource users. As Adger states:

[it] is important to note that, because of its institutional context, social resilience is defined at the community level rather than being a phenomenon pertaining to individuals. Hence, it is related to the social capital of societies and communities (Adger, 2000:349).

How many people in a community need to be engaged in the management of the ecosystem and have ecological knowledge in order for the community to be socially resilient? This question should be of particular importance in industrialized countries,
where resource users neither depend upon the resource for their livelihood nor live in close proximity to the resource system. Therefore, it is reasonable to assume that there often might be too few resource users engaged in the management of natural resources.

Adaptive co-management is grounded in the appreciation of the interconnectedness between ecological and social systems and emphasizes how essential it is to take social and economic factors into consideration when establishing natural resource management systems. In other words, adaptive co-management does not promote conservation per se, but rather the utilization of natural resources in a sustainable way, ensuring that no loss of resilience takes place. A management system of natural resources can be considered adaptive if relevant goals regarding resources are met (such as the size of the moose population). Consequently, one indicator of whether MMUs are adaptive co-management systems is if resource users have been successful in reaching their goals for the size and composition of the moose population. This will be further investigated in Chapter 9. Meanwhile, the next section will discuss local ecological knowledge.

**Local Ecological Knowledge:**

Advocates for adaptive co-management do not turn their backs on science, but acknowledge the existence of ecological knowledge among resource users. “It comes as no surprise that knowledge of ecosystem dynamics and associated management practices exists among people of communities that, on a daily basis and over long periods of time, interact for their benefit and livelihood with ecosystems” (Folke, Hahn et al., 2005:445-446). To have ecological knowledge, one must understand the interaction between and among organisms and their environments (Berkes in Olsson & Folke, 2001). Knowledge of natural resources can be divided into three categories. The first is local ecological knowledge (LEK) that resource users have gained through observations of the local environment. This may be a mixture of practical and scientific knowledge complementing each other. LEK consists of a series of local observations over time, which is difficult to attain with “traditional” science (Folke,
In their study of cray fishing in Lake Racken in Sweden, Olsson and Folke identified a mix of scientific knowledge and LEK. The LEK was obtained by means of monitoring at the local level and was complemented by scientific and governmental sources (Olsson & Folke, 2001). The second type of knowledge is *indigenous knowledge*, which is understood as the LEK of indigenous people. The third type of knowledge is *traditional ecological knowledge*, which is the knowledge derived from historical and cultural continuity (Berkes, 2003b:12). Sacred groves set aside for religious purposes exist in rural areas of India and can constitute everything from a patch of trees to a forest. Religious beliefs have, in these cases, protected animal refuge areas from human utilization (Colding et al. 2003:176).

Adaptive co-management calls attention to the existence of LEK and how it—in combination with scientific knowledge—can improve the sustainable utilization of natural resources. In addition, adaptive co-management highlights problems with knowledge amid the public administration and in association with the implementation of policy.

Nor should we presume that officials have all relevant knowledge to manage complex dynamic systems while local appropriators are ignorant. The knowledge base of government officials may not, in reality, be better than that of local appropriators, who have used a particular resource for years and know its characteristics in considerable detail (Ostrom, 2005:238).

One problem with a centralized system is that, when policies are implemented, it requires that all common-pool resources under its jurisdiction be experimented with; if this fails, the consequences are far-reaching. Conversely, if there are parallel local resource management systems in place, even if some might fail, some will succeed. In addition, if there are efficient information exchanges among the local resource systems, these systems each can learn from others’ mistakes (Ostrom, 2005:284).

The Convention on Biological Diversity states that it is critical to consider indigenous as well as LEK when managing natural resources. According to the eleventh Malawi principle, the ecosystem approach should include all kinds of relevant sources of information, such as scientific, indigenous, and LEK as well as innovations and practices (www.cbd.org). The Centre for Biological Diversity in Sweden has been
documenting efforts made to implement paragraph 8j of the CBD (Tunón, 2004). However, few efforts are made to document traditional knowledge, and multidisciplinary efforts at documenting such knowledge have encountered difficulties in receiving research funding in Sweden (Tunón, 2004). Nevertheless, the Swedish government has also emphasized the importance of LEK in the management of natural resources:

Local and traditional ecological knowledge should be tied to its role in monitoring changes in the environment, and its role in monitoring the environmental condition. It is important to utilize local resource users’ ecological and practical knowledge in the management of natural resources and ecosystems (Skr. 2001/02:173:121, author’s translation).

Thus, the Swedish government considers it important to incorporate LEK in natural resource management and to adhere to the above-described ideas. However, it might not be so easy to accomplish this integration of LEK into management practices.

LEK is acquired through learning-by-doing, which usually leads to an intuitive feeling for the characteristics of the environment. For example, research on coastal fishing in Iceland has revealed that skippers have a three-dimensional view and can identify patterns on the sea floor. One potential problem with cooperation between local resource users and scientists is a “communication problem.” In Iceland, where efforts have been made to increase cooperation between fishermen and scientists, it has become apparent that a “translation” problem exists (Pálsson, 1998:48-65). However, this might not be the only difficulty. Some researchers have focused on the fact that “…the spread of ecological illiteracy in contemporary societies needs to be counteracted” (Folke, Carpenter et al., 2002:52).

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9Convention on Biological Diversity (Article 8j) “Subject to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices” (http://www.biodiv.org/convention/articles.asp).

10There are no firm definitions concerning what should be classified as traditional and local communities embodying traditional lifestyles, etc. However, the Centre for Biological Diversity suggests that indigenous Sami people, tundra farmers, and archipelago fishermen be included in the definition.
Although the Swedish government has declared the utilization of LEK as important, such utilization should not occur without prior scrutiny concerning the reliability of the knowledge.

Traditional knowledge does not automatically have to be “right” knowledge. It is necessary to critically evaluate all kinds of knowledge, including traditional and local ecological knowledge (Skr. 2001/02:173:121, author’s translation).

Davis and Wagner searched the Social Science Citation Index (SSCI) in order to examine articles published on LEK. They found that, out of 65 articles, only 22 contained empirical studies in the form of case studies; out of those 22, only four described the study methodology in detail (Davis & Wagner, 2003). In other words, empirical research regarding LEK remains fairly limited. Apparently, a lack of consensus remains regarding many important methodological concerns. As mentioned, there is also a lack of quantitative studies that might increase the generalizability of results. Despite this apparent lack of empirical studies of LEK, policy makers in both the national and international arenas have emphasized LEK’s importance regarding the management of natural resources.

One recent study regarding LEK of various bird species among Inuit peoples in the Arctic disclosed that dramatic declines in population would have gone undetected by western science if not for the reports provided by the local resource users. The study also disclosed that there was a difference in the scope and quality of knowledge of different species. As a result, the authors called for research specifically exploring the relationship between species and the local community. For example, if a species were non-migratory, this increased the knowledge about the species. However, the study indicated that LEK cannot track population changes except for catastrophic declines; therefore, scientific monitoring is a critical complement (Gilchrist, Mallory et al., 2005). Another important question related to LEK is how many people in a community need to have ecological knowledge for it to be defined as local ecological knowledge? In essence, this discussion is the same as the one regarding the resilience of a community (Davis & Wagner, 2003; Moller, Berkes et al., 2004). Another
difficulty is how to treat incorrect LEK or a combination of correct and incorrect LEK.

In order for the active in MMUs to possess local ecological knowledge, they should not only spend time in the ecosystems, but also use LEK when making decisions on, for example, resource extraction. They also need to be able to comprehend basic scientific knowledge, such as how to use monitoring methods, especially as the resource is mobile. The importance of key stewards in conveying scientific information, for example, is emphasized in the adaptive co-management literature, which will be discussed in Chapter 9 by analyzing interviews conducted with actors within the moose administration on diverse levels. The next section will examine ecosystem management.

**Ecosystem Management:**
Contrary to conventional resource management, adaptive co-management takes into consideration the entire ecosystem, not only single resources. In a similar fashion, ecosystem management treats single resources as part of a complex network of processes and functions on distinct spatial and temporal scales (Olsson & Folke, 2001). For example, a change that occurs in the predatory population might greatly affect the entire food chain and have far-reaching consequences that might be difficult or even impossible to predict. Another perspective of ecosystem management is that both slow and fast processes in the system are monitored and taken into consideration. Therefore, not only fast processes, such as species abundance, but also slow properties, such as changes in soil or pH levels in water, should be monitored (Olsson & Folke, 2001). In other words, a significant difference between ecosystem management and conventional resource management is that the former emphasizes the goal of understanding the whole ecosystem, not only detailed information about specific species (Folke, Hahn et al., 2005).

The twelfth Malawi principle states that an ecosystem approach should include all relevant sectors and scientific disciplines. “Most problems of biological diversity management are complex […] and […] involve the necessary expertise and stakeholders
at local, national, regional and international level” (www.biodiv.org). Ecosystem management can be applied by all levels in a natural resource management system. Local appropriators can apply ecosystem management by paying attention to diverse processes and resources in an ecosystem, not only a single resource. Public administration at the regional and the national level can also apply ecosystem management. This necessitates cooperation among separate public administrations as these different units are usually specialized for one particular type of resource or resource system. However, this is not so easy to accomplish.

The ecosystem management literature focuses on the problems of conflicting interests and how these turn natural resource management policies into nightmares. Yaffe recapitulates reasons for catastrophic policy outcomes regarding natural resource policies: short-term rationality out-competes long-term rationality, competition supplants cooperation, fragmentation of interests and values, fragmentation of responsibilities and authorities, and fragmentation of information and knowledge (Yaffee, 1997). Ecosystem management requires systems thinking, which in turn often implies multidisciplinary interaction that transgresses traditional fields of expertise (Yaffee, 1996). State agencies often try to protect their “turf” (i.e., their policy area) and operational responsibilities in order to—among other things—secure jobs and traditional priorities while avoiding challenges to professional expertise (Imperial, 1999). If a public administration is to conduct ecosystem management, it requires cooperation among various state agencies if diverse expertise is required. Ecosystem management applied to wildlife, for example, might require cooperation among different state agencies, such as CABs and the Forest Agency, which in turn necessitates the capacity to cooperate. However, such cooperation has proven difficult as many times it violates existing norms of the public agency relating to its idea of expert knowledge (Yaffee, 1996). This situation affects the organizational culture of the public administration that manages natural resources, as discussed previously. However, ecosystem management also “…focuses on issues and concerns that cut across traditional interests and coalitions that may affect long-standing political relationships among agencies, constituents, and legislators” (Yaffee, 1996).
Ecosystem management involves a holistic view of the environment. For example, it is critical that the resource users monitor not only the moose population, but also other ecosystem properties. Hence, if MMUs apply ecosystem management, they should pay attention to variables other than moose. For example, do resource users actually conduct a local grazing damage inventory? This would be an indication of whether they also pay attention to other aspects of the ecosystem. Another indicator to measure is whether they have recognized grazing damage on various tree species—not only pine, which is commercially valuable. If they have noted the degree of grazing damage to various tree species, this would indicate that they pay attention to variables in the ecosystem other than the moose population. However, one also can respond to ecosystem feedback through wildlife care efforts, such as improving grazing conditions by forest clearing, feeding wildlife, and establishing wetlands. The next section will address monitoring.

**Monitoring:**

When managing moose, it is critical to obtain information regarding population sizes. If there are no ways to determine the population size, it becomes impossible to decide how many moose to shoot or how many fish to catch. It is more difficult to achieve high reliability or predict future conditions with mobile resources when compared to stable resources, such as forests and pasture lands (Dietz, Dolsak et al., 2002:19). Declines in populations that result from unclear reasons—whether they be due to appropriation levels, migratory patterns, or infestation—impede the ability of resource users to agree on appropriate institutional arrangements. This in turn leads to greater incentives to “free-ride” (Blomquist, Schlager et al., 2000:118). Hence, monitoring of the resource is crucial for managing animal resources adaptively. Typically, traditional monitoring methods of wildlife cost little, are rapid, and are performed in connection with the harvesting of the resource. Some traditional monitoring methods are “catch per unit effort” (CPUE), body condition index, breeding success, and collective information gathering while hunting (Moller, Berkes et al., 2004). Traditional methods used in connection with the harvest require that the “sampling” not be
random due to factors such as the skill of the hunters, the relative abundance of the resource, and the time it takes to slaughter the animals. The strengths of scientific monitoring are that it has higher spatial generality, is quantitative and objective, and can be decoupled from harvesting (Moller, Berkes et al., 2004). However, interestingly enough, the most widespread monitoring method of moose in Sweden, ÄlgObs, is conducted during the hunting season (see Appendix 5 for more detailed information on monitoring methods). In other words, this method is not decoupled from harvesting, but has still proven to be a reliable monitoring method. In one project, wildlife biologists were trying to implement CPUE by having hunters fill out diaries, albeit with unsatisfactory results (Wallin, Vikberg et al., 2003). Conversely, traditional CPUE is often conducted in such a manner that the hunters keep a mental note of their CPUE relative to expected CPUE based upon previous experience (Moller, Berkes et al., 2004). The scientific version of CPUE is more time-consuming to perform and, therefore, perhaps less likely to appeal to hunters.

As the monitoring of resources is an important part of natural resource management, it is important to examine to what extent MMUs have utilized monitoring methods and what kind of methods they use. All monitoring methods have their strengths and weaknesses, and it is likely that reliability increases if local resource users utilize more than one monitoring method. Hence, not only if they use monitoring methods, but also whether they combine several methods will be investigated in Chapter 9.

**Learning:**

In the adaptive co-management approach, substantial emphasis is placed on the importance of social and institutional *learning*, resulting in a social memory of the community, which is communicated by numerous actors. Some of these might be wise men, interpreters (people that explain ecological knowledge to the community), networkers, visionaries, innovators, implementers, followers, and reinforcers (Folke, Colding et al., 2003:366-368). In the Lake Racken study, the key steward was a biology teacher who conveyed scientific findings to the other resource users (Olsson &
Folke, 2001). Other case studies have revealed that local policy entrepreneurs may play a critical leadership role. In one such case study, this person provided vision and goals that altered the view of key actors. This individual also mobilized social networks with actors across distinct scales and organized information that generated knowledge that could be used for management practices of ecosystem dynamics. At the political level, a window of opportunity facilitated the establishment of a municipal organization that was flexible and linked local actors and governmental bodies, thereby promoting adaptive management of the wetland landscape (Olsson, Hahn et al., 2004). Thus, key stewards are important for promoting the development of adaptive co-management systems and can also act on different jurisdictional levels (e.g., either on a local level or on higher levels, such as the municipality level or regional level, depending on the overall structure).

“A major challenge concerning the problem of fit is to build institutions that monitor ecosystem change, and that generate, accumulate and transfer ecological knowledge and understanding” (Folke, Pritchard et al., 1998:21). Certain types of organizational structures promote learning—for example, decentralized organizations—as these enhance the potential for collective learning (Röling & Jiggins, 1998). However, social conflicts can inhibit the process of learning if individuals employ strategic behaviors and, thus, negatively affect the ability to respond to environmental crises (Galaz, 2005).

As a critical feature of adaptive co-management is learning, the perspective of time also becomes important. It is assumed that the local resource users will, over time, learn how to perform monitoring, calculate the correct shooting off of moose, and so on. Therefore, it will be investigated whether MMUs have improved their performance over time (Chapter 9). However, the importance of key stewards is also highlighted in the adaptive co-management literature; regarding MMUs, these can either be active within the MMU or on the municipality or regional level. In addition, the presence of key stewards on the local level will be discussed in Chapter 9, on the national level in Chapter 10, and on the regional level in Chapter 11.
Contrary to adaptive management, the adaptive co-management approach highlights the importance of the participation of local resource users. Local resource users can manage resources in a sustainable way if they have LEK, conduct monitoring, apply ecosystem management, and learn over time. As local resource users play a paramount role in the adaptive co-management approach, this begs the question as to what role the state is supposed to play in such systems. This is the topic of the next chapter.
THE ROLE OF STATE AUTHORITY IN ADAPTIVE CO-MANAGEMENT

The tasks of the state in adaptive co-management is to ensure that local resource systems do not become isolated. The state might provide conflict arenas to solve disputes among local resource systems, enhance technical and scientific skills, and integrate LEK in management processes. These assorted tasks of the state will be discussed in this chapter.

As already highlighted, there are potential problems with local resource systems as well. The most serious obstacle to the establishment of adaptive co-management systems is, of course, if resource users are not motivated to engage in resource management even though they possess management rights. Other impediments might be that local appropriators do not have appropriate tools or do not possess LEK. Another potential difficulty is the fact that local resource systems can become isolated from other units and the public administration. This is particularly unsatisfactory if the social scale is a mismatch to the ecological scale, which is likely to be the case if the resource is mobile. Although collective action among resource users might be facilitated in smaller communities, it is likely that mobile resources will migrate over several local resource units. It is probably difficult to achieve collective action via the initiative of local resource users that extends over extensive territorial space. This necessitates cooperation among local resource units; thus, the state may play an important role in providing arenas where this can take place.

However, other problems of highly decentralized systems are that, in some local systems, appropriators will not organize or at times might establish rules resulting in
resource degradation (Ostrom, 2005:281). For example, one study demonstrated that, despite the presence of a well-organized and regulated small-scale fishery, the outcome was unsustainable resource utilization. This was due to changes in technology together with dependence on fossil fuel, which inhibited learning about the resource as well as removed incentives to change fishermen’s behavior (Huitric, 2005). However, the fact that at times local governance systems might be undemocratic and dominated by a local leader or elite who might either create rules beneficial for themselves or fail to listen to the advice of appropriators or governmental officials with a higher level of knowledge, might lead to unsustainable resource utilization (Ostrom, 2005:281). Once again, the state can mitigate some of these potential problems of local resource systems.

Ostrom’s concept of polycentric institutions highlights the importance of achieving the right balance between centralized and decentralized control of management (Folke, Colding et al., 2003). In other words, both the local level and central level have a role to play. Therefore, it is not sufficient to have units exercising authority over geographical areas without any contact between them. Thus, researchers seem to agree on the importance of linking local resource systems to other scales (Berkes, 2002, 2003a; Cash & Moser, 2000; Low, Ostrom et al., 2003; Murphree, 2000). Linkages can be either vertical or horizontal. Vertical linkages are connections on a spatial level while horizontal linkages occur on an organization level (Berkes, 2002). Generally, the specific characteristics of a CPR determine how important it is to have linkages. If the resource is part of a highly complex ecosystem and its use results in extensive negative externalities, linkages are critical (Dolsak & Ostrom, 2003). In addition, attributes of the resource, such as high mobility, require management on larger geographical scales, which is impossible to achieve unless local systems are well coordinated or under centralized jurisdiction (Dolsak & Ostrom, 2003). Thus, the presence of larger, overlapping jurisdictions is an important complement to the working of local level systems.

One important role for the state is to ensure that local resource systems cooperate with each other and are coordinated (Folke, Carpenter et al., 2002; Low, Ostrom et
al., 2003; Murphree, 2000; Ostrom, 2005; Pinkerton, 1999). As discussed, one reason for this is to facilitate congruence between ecological and spatial scales (Dolsak & Ostrom, 2003; Murphree, 2000). If local resource management systems cooperate with each other, it increases the likelihood of fundraising, which can be used to increase the level of knowledge of the resource systems. For instance, although the monitoring of resources is critical, this might at times be too expensive to conduct, especially if monitoring is to be performed on larger geographical areas. Another benefit of vertical linkages is that local appropriators can learn from each others’ experiments and, consequently, improve their resource management strategies (Ostrom, 2005:280). Pinkerton even claims that the power of a local system to change and subsequently affect other local systems is underestimated in the adaptive co-management theory (Pinkerton, 1999). The chances that novel management ideas will arise when a large number of units exercise management autonomy are great; however, for these to spread, there needs to be arenas that facilitate the dispersal. However, at times, conflicts are likely to arise among local resource systems.

Another task for the state is providing arenas for conflict resolution in which conflicts between local resource systems can be solved inexpensively and efficiently. Thus, public managers have to take on the role of a mediator or facilitator for conflict resolution (Low, Ostrom et al., 2003:108). Without access to inexpensive conflict-resolution mechanisms, a situation of intense conflicts might arise and inhibit cooperation. The fact that the public administration is to act as a mediator/conflict solver necessitates that the resource users also find it impartial and objective.

Another responsibility of the resource management is to provide scientific and technical skills to complement LEK (Ostrom, 2005). Therefore, public administrators should not only understand, but also convey scientific findings to appropriators who may have a poor educational background and, therefore, difficulties in understanding scientific concepts. The extraction of natural resources is often exercised by people pursuing a recreational activity, such as fishing or hunting. This requires that the public administration effectively communicate the relevant scientific and technical information to these users. The communication of scientific information might also be
a practical problem. In Sweden, for example, there are approximately 267,000 hunters; to reach every single one of these with new information is, naturally, problematic and expensive.

However, the transmission of knowledge is a “two-way street” as the public administration also should ensure that local observations of the environment are integrated into the management process and not ignored. Furthermore, the Swedish government believes it is imperative to tie LEK across distinct scales to promote sustainable development:

Local ecological knowledge and the organizations that possess it should constitute an essential part of nature conservation. Conservation also must be linked to other levels—municipalities—County Administrative Boards among others—in order to contribute to sustainable management (Skr. 2001/02:173:121, author’s translation).

The public administration is expected to be able to evaluate and facilitate the dissemination of LEK. Even researchers struggle with how to measure and evaluate LEK, and many empirical studies have been conducted without using proper methodology (Davis & Wagner, 2003). In addition, the task of combining LEK with scientific knowledge is something that the public administration might handle. This has been highlighted as something very difficult to achieve due to the epistemological differences between the two types of knowledge (Pålsson, 1998). Finally, the role of the state is also to take care of natural disasters, corruption, and inefficiency—namely, problems that cannot be solved at the local level (Low, Ostrom et al., 2003).

The role of the state in the adaptive co-management approach differs quite significantly from the adaptive management approach, but also from conventional resource management. Therefore, it is important to systematically analyze the most vital differences between conventional resource management and adaptive co-management. The next section will discuss the main differences between adaptive co-management and conventional resource management, focusing on the legitimacy of the public administration and its organization and tasks.
In democratic societies, it is the public administration that implements the formal rules decided by legislatures. It is critical that citizens in such a society find the public administration legitimate as it is here they in practice encounter laws and policies as well as are enforced to submit to its authority (Gregory, 2003; Peters & Pierre, 2003). There are diverse ways of organizing the public administration in order to ensure the legitimacy of the citizens. There are different ‘ideal types’ of the public administrations that can be utilized as analytical measurement in order to judge in what way and to what extent a certain public administrative structure has characteristics similar to a certain ideal type. Common ‘ideal types’ or models are the legal-rational bureaucracy model, professional model, corporatism, client model, political representation model, and lottery-based model (Rothstein, 1991). Conventional resource management is typically implemented by a public administration that can be characterized as legal-rational bureaucracy. However, as has been mentioned, the Swedish moose administrative system also has characteristics of the corporativistic model as the hunting interest organization SAHWM has been granted the official assignment to lead wild care in Sweden since 1938 (SOU 1997:91). As previously mentioned, corporatism is defined as the officially sanctioned participation of organizations in the political system, such as in administration (Lewin, 1994:66).

The grounds for legitimacy for the legal-bureaucratic public administration type are the existence of general rules that are centrally decided and precise in their formulation. The public administration is viewed as a neutral tool implementing formal rules decided by the legislature. The precise rules allow citizens to calculate the consequences of their adherence to the rules (Rothstein, 1991). The bureaucracy can make decisions that have a legal effect on its citizens, such as the execution of powers deciding the benefit, right, obligation, and disciplinary actions of the individual citizen. In other words, these kinds of decisions serve as an expression of the state-held right to exert the power of authority over its citizens (Wennergren, 2000:25). All these decisions are an execution of public authority and are therefore constrained by specific administrative laws that regulate their working procedures and ways of dealing
with citizens, with appeal systems for decisions made by the administration in order to secure citizens’ civil rights (Wennergren, 2000). The specific tasks and role of the public administration have also led to a special organizational form.

According to Weber’s definition of bureaucracy, it has four main distinguishing features: 1) hierarchy (the organization is hierarchal in that each civil servant has clearly defined responsibilities and answers to a superior), 2) continuity (salaried work with possibilities of career advancements), 3) impersonality (the civil servant is impartial when implementing rules and decisions are documented), and 4) expertise (appointments are made according to a formal merit system and the civil servants are trained for their position) (Beetham, 1996:9-10). Hierarchy is an effective organizational form for the implementation of law whereby values such as predictability, uniformity, and accountability are ensured (Peters & Pierre, 2003).

A corporativistic administration is quite distinct from the legal-rational bureaucratic administration. In addition, there can be different types of corporate arrangements. At times, a state might grant a particular interest organization the authority to participate in the implementation within a particular policy field to facilitate policy success. However, another type is when the state provides arenas in which opposing interests meet and make policy decisions. A notable difference between this type of corporate arrangement and the legal-bureaucratic administration is that the decision procedure in the corporate model is based on negotiations among diverse interests. This decision procedure forces organizations that have conflicting interests to confront each other to reach agreements (Rothstein, 1991). However, in order for interest organization not to radicalize their demands, they have to meet substantial opponents (Öberg, 1994). One reason for a state to choose corporate arrangements is to facilitate the implementation of policies and reduce conflict among diverse interests in society.

There are diverse ways to organize the public administration in order to gain legitimacy from citizens and facilitate implementation of rules decided by legislatures. Therefore, it is relevant to examine what types of public administrations respectively match conventional adaptive co-management systems.
The grounds for legitimacy of the public administration as well as the organization and task of the public administration differ in conventional resource management compared to adaptive co-management, as can be seen in Table 3. Conventional resource management applies single-species management to achieve maximum sustainable yields (MSY) (Berkes & Folke, 1998). In conventional resource management, after scientists have calculated the size of resource quotas, the assignment of the public administration is more technical in nature (i.e., implementing the goals). Regarding ocean fisheries for example, decisions on questions such as the size of the fishing quotas, the fishing season, and the licenses of fishing equipment are based on scientific knowledge (Wilson, 1998). Conventional resource management is best organized via a hierarchal structure whereas subordinates follow “orders” issued from higher levels within the organization. The advantages of this type of management system is that rules are precise and, to a certain extent, foreseeable to the appropriators. In addition, the issue of accountability can be satisfied as the regular system of appeals can be utilized to secure the protection of citizens’ civil rights.

However, top-down systems often suffer legitimacy deficits among local resource users. It is critical that appropriators with the potential to break rules believe the system is legitimate. If appropriators consider regulations illegitimate, they will likely ignore them, which of course lead to even greater legitimacy problems. Once regulations are not complied with, the system becomes illegitimate; thus, a vicious cycle begins. To prevent access for persons not abiding by specific rules, costs can become extremely high (Dietz, Dolsak et al., 2002:19). As previously discussed, in order for formal rules to be implemented successfully, they should not contradict informal rules, especially when the detection and sanctioning of disobedience with formal rules are difficult and/or expensive to enforce (Knight, 1992; Nee & Ingram, 2001; North, 1990). The Swedish ocean fishery is a typical conventional top-down management system; however, the Swedish Board of Fisheries agreed to implement a system of co-management, as had been suggested by the Swedish National Fishermen Association, in a fishery in northern Sweden due to its difficulties in achieving legitimacy for its fishing policy among trawler fishermen. The co-management system
increased collective action among trawler fishermen and contributed to a more sustainable fishery (Rova, 2004). Due to the high legitimacy deficits for the Swedish predatory policy implemented via a top-down management system, co-management systems on the regional level have been suggested as a measure to increase legitimacy for predatory policies, thereby diminishing the extensive illegal hunting of predatory animals, in an official investigation. The EPA would still have a supervisory role, such as ensuring compliance with international conventions (SOU 2007: 89:430).

The basis for legitimacy in adaptive co-management is the goal of ecological and social sustainability, which requires the engagement of diverse groups and people to be achieved. Therefore, one principal task of the public administration is policy creating within limits or general goals set by higher jurisdictional levels; as adjustments need to be made to specific local ecological and social contexts, this requires high flexibility on the part of the administration. One key insight of the adaptive management approach is that ecosystems are non-linear and unpredictable and that the management should always expect surprises. Learning of public administrators, therefore, becomes important; as previously discussed, this has been lacking in conventional resource management (Hillborn in Ostrom & Janssen, 2002:9). Thus, ecosystem management might be applied on all levels in a natural resource system, not only by local appropriators. The application of ecosystem management means that all variables in an ecosystem should be managed from a holistic view, which requires that people from diverse subject fields and state agencies cooperate.

The above-enumerated factors have significance in how the public administration should be organized and what kinds of tasks it has to perform in order to meet these diverse requirements. Adaptive co-management is dependent on a flexible management system that can not only detect changes in ecosystems but also respond to these quickly and adequately. For example, corporate arrangements wherein administrative tasks are assigned an interest organization are often chosen because it believed that, as these are close to the groups that the policies affect and have a greater understanding of specific situation, they can also have a higher flexibility in implementing rules (Rothstein, 1992:592).
This is also a way for the state to ensure that its policies will have legitimacy among affected citizens. What then is the reason for interest organizations to participate in the political process? One obvious reason is that interest organizations gain influence over important administrative decisions that will affect members of their organizations (Rothstein, 1992). However, if policy implementation is accomplished via corporate arrangements, it denotes that there might conflicting interests represented in the public administration and might not be perceived as objective and neutral. The fact that higher jurisdictional levels might be characterized by conflicting interests in specific arrangements is not problematized to a great extent in the adaptive co-management literature.

However, another difficulty associated with flexibility is that it is at odds with other important values that the public administration should take into consideration, such as accountability and respect for legal rights, which are easier met in conventional resource management systems organized as hierarchies. These differences signify difficulties if policy makers wish to transform conventional resource management systems into adaptive co-management systems.

Perhaps the biggest overall challenge is the fact that the public administration was constructed for single-species management; therefore, ecosystem management

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**Table 3. Conventional Resource Management versus Adaptive Co-management.**

<table>
<thead>
<tr>
<th>Type of System</th>
<th>Conventional resource management</th>
<th>Adaptive co-management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grounds of legitimacy</td>
<td>Top-down management</td>
<td>Bottom-up management</td>
</tr>
<tr>
<td></td>
<td>Maximum sustainable yield</td>
<td>Ecological and social sustainability</td>
</tr>
<tr>
<td></td>
<td>Single-species management</td>
<td>Ecosystem management</td>
</tr>
<tr>
<td></td>
<td>Scientific knowledge</td>
<td>Scientific knowledge &amp; LEK</td>
</tr>
<tr>
<td></td>
<td>Precise and general rules</td>
<td>Flexibility &amp; learning</td>
</tr>
<tr>
<td>The role of the public administration</td>
<td>Application of scientific knowledge</td>
<td>Information collection &amp; distribution</td>
</tr>
<tr>
<td></td>
<td>Interpretation of rules</td>
<td>Connecting local systems</td>
</tr>
<tr>
<td></td>
<td>Impartiality and objectivity</td>
<td>Mediator</td>
</tr>
<tr>
<td></td>
<td>Hierarchal organizational</td>
<td>Flexible organizational structure</td>
</tr>
<tr>
<td></td>
<td>structure</td>
<td></td>
</tr>
</tbody>
</table>

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requires considerable restructuring of the entire public administration dealing with natural resources. In Sweden, for example, single-species management has entailed that wildlife, forestry, and predatory animals are managed separately even though all are interconnected in ecosystems.

However, other alterations are also required if there is going to be a shift in management systems. For example, the role of the public administrators differs as the main task in conventional resource management is to implement rules while in adaptive co-management the main task is coordinating LEK and scientific knowledge, establish linkages between local systems if necessary in order to ensure management on appropriate ecological scales, and mediate among local resource systems if conflicts arise. Perhaps the most important skills of public administrators are those that relate to their functioning as a network facilitator, ensuring smooth coordination among local resource systems.

To summarize, contrary to both conventional resource management and adaptive management, adaptive co-management can described as a bottom-up management system. A central prerequisite is that resource users have extensive management rights. The approach requires that local resource users have a significant responsibility in managing natural resources. Perhaps it is too far-fetched to believe that adaptive co-management would function in countries where local resource users are not dependent on the resource for their livelihood, where they do not live in close proximity to the ecosystems, where they have limited time to spend on natural resource management, and where LEK is rare. This begs the question of whether this approach is more of a utopia with limited practical use. This will be further discussed in Chapter 9.

However, as argued in Chapter 2, by establishing MMUs, hunting rights owners have gained management rights. One earlier case study revealed that, due to changes in legislation that signified procured management rights for fishing rights holders, they succeeded in establishing a fishing rights association that can be characterized as a adaptive co-management system (Olsson, Folke et al., 2004). This thesis seeks to clarify whether this has also taken place in the MMUs as the
prerequisites are similar. The first question to be answered is to what extent MMUs can be regarded as adaptive co-management systems. The next section will summarize the discussion thus far.

4.2 Adaptive management or Adaptive co-management?

As previously discussed, adaptive management and adaptive co-management have separate qualities and implications for legitimacy and public administration. The following part of this chapter will summarize these. *Adaptive management* is similar to conventional resource management in that it is a top-down management system in which scientists and resource managers decide the kinds of policies that should be implemented. The role of the local resource users is limited to assisting in the management of the resource. *Adaptive co-management*, on the other hand, can be characterized as a bottom-up system, whereby local resource users are expected to manage the resource quite independently (see Table 4).
Table 4. Adaptive management versus Adaptive Co-management

<table>
<thead>
<tr>
<th>Management System: top-down</th>
<th>Management System: bottom-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale: ecosystem scale</td>
<td>Scale: local resource system</td>
</tr>
<tr>
<td>Actors: researchers and administrators</td>
<td>Actors: local resource users, the state, and organizations</td>
</tr>
<tr>
<td>Ownership: state-owned property</td>
<td>Ownership: private, state, or communal</td>
</tr>
<tr>
<td>The role of the state: active participation in the management</td>
<td>The role of the state: supply of overreaching tasks such as providing scientific knowledge and ensuring linkages between local resource systems</td>
</tr>
<tr>
<td>Experimental learning</td>
<td>Trial-by-error learning</td>
</tr>
<tr>
<td>Type of knowledge: scientific knowledge</td>
<td>Type of knowledge: a combination of scientific and local ecological knowledge</td>
</tr>
<tr>
<td>Institutions: independent variables</td>
<td>Institutions: dependent variables</td>
</tr>
<tr>
<td>Theoretical background: system theory</td>
<td>Theoretical background: system theory, collective action theory, and institutional theory</td>
</tr>
<tr>
<td>High costs and high risks</td>
<td>Low costs and low risks</td>
</tr>
</tbody>
</table>

The scale of adaptive management is that of ecosystems that are quite large (Gunderson, Holling et al., 1995). The basic unit in adaptive co-management is that of a local resource system, which is primarily defined on the societal level (i.e., a local resource system of some sort of a resource unit or units) and not an ecosystem per se. However, it is considered vital to establish linkages between local resource systems so as to benefit from vertical coordination on appropriate ecosystem scales.

In adaptive management, the principal actors are researchers and public administrators who establish ecosystems models. The involvement of stakeholders is complicated due to the fact that the approach requires comprehensive scientific knowledge, especially in order to understand ecosystem model building. Most stakeholders would probably not understand these models or the scientific basis for experiments. For example, Gunderson fears that, if stakeholders have too much influence, this inability will result in a disregard for the importance of science in the process (Gunderson, 1998). Another difficulty might be that conflicts among diverse interests spill over into the adaptive management process to hinder learning as scientists might be employed by various interest groups to specifically further their
interests, inhibiting the impartial process of model building. Thus, real stakeholder influence in adaptive management might be very difficult to achieve.

The principal actors in adaptive co-management are local resource users. This approach requires that resource users invest considerable time and effort in managing resources. However, the state is also supposed to take a role in ensuring that local resource systems do not become isolated. The state authority might provide scientific information and take on tasks better solved at higher jurisdictional levels (Ostrom, 2005). Organizations can also play a role in adaptive co-management by providing information, ensuring linkages, and so on. However, the importance of the involvement of the state and organizations also depends on resource characteristics as mobile resources, for example, require coordination on larger geographical scales, which is more easily achieved by the state than local units.

In addition, the importance of property rights has to be highlighted. The adaptive management approach seems to require state-owned property to be implemented successfully. If there are strongly protected individual or communal property rights in place, it would be difficult to implement the centralized approach as it is fairly invasive. Perhaps the adaptive management approach, at least in its “extreme” form, can only be justified when ecosystems are near collapse. Adaptive co-management, on the other hand, requires extensive management rights in order for resource users to be able to apply adaptive management. It is, of course, possible to extend management rights to local resource users on state property, thereby implementing some kind of co-management system. However, in essence, the two approaches require different property rights structures to be successful.

The type of learning in the two approaches is, in essence, based on the same epistemological grounds (i.e., learning by conducting experiments). However, in adaptive management, it is stringently applied by laws of experiments while in adaptive co-management the application is more imprecise. In adaptive co-management, the focus is also on conveying and interpreting information among resource users (Folke, Colding et al., 2003).
Adaptive management is solely based on scientific knowledge while adaptive co-management differs in its focus on combining scientific and local ecological knowledge. One problem is the question of whether local resource users possess LEK. Another potential problem is if they can truly understand scientific knowledge. It is not likely that every MMU will have skillful stewards at their disposal, but this will be further discussed in Chapter 9.

In adaptive co-management, the role of institutions is critical in explaining success or failure of natural resource management systems. The interaction of formal and informal rules is critical in understanding why individual resource users act in certain ways. There is also room for changing rules, especially formal rules, in order to contribute to sustainable resource utilization—however, not without taking into account norms of diverse local resource groups as these, if contradictory, can mitigate successful implementation of formal rules. The adaptive management approach is more “technocratic” and static in its view of the institutional context.

Although adaptive management is solely based on systems theories and only takes into consideration ecosystems, adaptive co-management on the other hand is also based on systems theory regarding ecosystems, yet it is also inspired by social theories such as collective action and institutional theory.

Another decisive difference between the approaches of and importance to policy makers is the fact that, in general, the adaptive management approach involves high costs and high risks while adaptive co-management is characterized by low risks and low costs. As have been discussed, the adaptive management approach is technocratic and requires the extensive involvement of scientists and experts. Moreover, the use of experiments is costly and can pose high risks as well. These perspectives have been highlighted by proponents of the approach and pose limitations for its implementation unless there is significant crisis in the ecosystem. On the other hand, the involvement of local resource users in adaptive co-management signifies low costs for the state as natural resource management tasks are performed on a voluntary basis. Moreover, the risk of the approach is quite low as the failure of one local resource system will most likely not have ramifications on other systems (Ostrom,
Naturally, this approach can also result in negative consequences if many local resource systems take inappropriate decisions; however, the risk factor is lower than in adaptive management. There can also be high costs for adaptive co-management if the state takes an active role and performs tasks such as providing scientific information or conducting monitoring on large scales and so on.

As should be obvious, there are many similarities between the two approaches and not only because they are based on the same concepts and ideas as the functioning of ecosystems. Both approaches, for example, emphasize learning collectively and continuously. It is also possible to combine adaptive co-management and adaptive management approaches. For example, if the property rights structure is conducive to adaptive co-management, it is possible to utilize certain aspects of adaptive management to improve resource management at the national or regional level.

When it comes to the Swedish MMUs, the prerequisites for the establishment of adaptive co-management systems are presumably in place; it will therefore be investigated as to how they can be characterized as adaptive co-management systems. As already mentioned the public administration plays a role in adaptive co-management by, for example, ensuring that local resource systems do not become isolated and provide these with technical expertise. Therefore, the characteristics of the public administration that promote or hamper the development of adaptive co-management systems will also be investigated and discussed in Chapters 10, 11, and 12. In the next chapter, the methodologies used in this thesis are presented.
In this thesis, several methods have been utilized in order to answer the three questions posed. 1) To what extent are MMUs adaptive co-management systems? 2) What characteristics of the public administration contribute or hamper the development of adaptive co-management systems? and 3) In what respect do the current structural features of the moose administrative system in Sweden differ from structural features highlighted in theory as critical to an “ideal adaptive co-management administrative system”?

A MMU database containing MMU plans from almost all MMUs in Sweden has been established. To answer the question regarding to what extent MMUs can be considered as adaptive co-management systems, a quantitative analysis of these data has been performed. The database has also been utilized in order to select two counties for a deeper investigation of the regional moose management system.

The empirical data collected for the case study of the counties included in-depth interviews with regional actors, document reviews, and participant observation in Wildlife Management Board (WMB sw. Viltvårdsnämnd) meetings. In addition, a questionnaire was sent out to the hunting administrators in twenty counties in Sweden. These data have been utilized as a reference to findings from the case studies and for a general description of the administration of MMUs in Sweden. A document analysis of official investigations, bills, and so on has also been conducted in order to describe historical changes of the Swedish moose administrative system.
**MMU Database:**

The general criteria for establishing an MMU is that the area is large enough to contain its own moose population. If hunting rights owners want to establish an MMU, they have to formulate a management plan that has to be approved by the County Administrative Board (CAB) (SFS 1987: 905 §3). The moose management plan should contain the long-term goal of managing the moose population and describe measures taken to restrict damage by moose to farm land, forests, and traffic. The plan should also contain information about the grazing situation, the size of the moose population (the winter population and a calculation of migratory moose), and the number of animals shot per year. According to the Environmental Protection Agency’s (EPA) directives, the CABs should revise the MMU management plans and undertake any necessary measures, such as deregistering MMUs (NFS 2002: 19).

Additional data have been collected and entered into the MMU database. The year of the establishment of each MMU was collected and entered into the database. SAHWM hunting consultants throughout the country have provided data about ownership of land viz. the MMU are constituted by private land, forest company land, or a mixture of private and company. This means that data exist regarding the ownership structure of each MMU in the database.

For the purpose of this study, all the MMU plans in Sweden have been collected and the information they contained entered into a database (see Appendix 1 for variables in the database). The database contains 637 MMU plans from twenty counties, which were collected during 2004\(^{11}\). Approximately 20 MMU plans could not be obtained at the time of the data collection. The number of MMUs per county varies from 4 to 89 in Sweden’s 20 counties containing moose populations. The MMUs extend over approximately 10.8 million hectares of land, and the size of the MMUs varies from 1,371 hectares to 247,000 hectares (median size = 10,061 hectares). Today, there are approximately 700 MMUs covering about 12 million hectares (SOU 2007:63:5).

\(^{11}\)There is no moose population in Gotland county.
Since 1992, it has been possible to establish MMUs; according to EPA guidelines, MMU management plans should be revised every third year (NFS:2002:19). However, counties differ in how often this is done. Only one version of a moose management plan was collected for each MMU, although some MMUs had submitted several versions over the years. The Swedish Hunting Association (SAHWM) formulated a template for moose management plans to be handed in to the CAB. However, this template has changed somewhat over the years; as a result, the MMU plans differ in the type of information available. In addition, some MMUs created their own MMU management plan format.

It is critical to keep in mind that, although individual landowners have decided to establish MMUs, there might be various organizations, such as WMAs, involved and, within these, many individual hunters and landowners. The MMU management plans are the stated goals of these individuals regarding moose management. Thus, the MMU plan is an expression of the goals and actions taken by the landowners and hunters who make up the units. There are no regulations as to the organization of the MMU itself.

In social research, it is always critical to take into consideration the context in which any record or document has been created—in other words, to examine for what purpose and audience the record was intended (Yin, 1994). Although there are many figures stated in the MMU plans, only certain ones should be accepted as “hard facts,” such as the size of the area. Other figures cannot be taken at face value, such as the number of moose per thousand hectares, as this is something that is extremely difficult to measure accurately. Unfortunately, there are regional differences regarding the kind of monitoring methods utilized as a prerequisite for using airplane inventory is snow (for further information of monitoring methods, see Appendix 5). Consequently, this monitoring method is rarely used in the southern or south-central part of Sweden. Another problem is that, even if it is stated in the plan that the MMU utilized—for example—airplane inventory, it is not known if it was conducted during that specific year or if it took place in previous years. Moreover, most monitoring methods are only reliable on a certain geographical scale, which means that most
MMUs are too small for the monitoring method to have high validity. This has entailed limitations for the utilization of the data in the database. However, some figures are an expression of the local resource users’ subjective perception of, for example, the seriousness of grazing damages and are therefore valuable information. The question of reliability and concept validity is discussed in Chapter 9, where data are represented. As the data have not been created for this specific investigation, a careful argument for concept validity is made so that operationalization appears transparent. Certain aspects of the adaptive management approach will not have any obvious corresponding variables in the database. However, indications of the presence of adaptive co-management features can be found among the variables in the database. In addition, interviews and the CAB questionnaire will be analyzed with respect to specific characteristics of adaptive co-management, such as the existence of LEK.

**Document Analysis:**

As previously mentioned, this thesis also contains a document analysis of official investigations, bills, and comments from diverse interest organizations and parts of the state, including various central public agencies and the government. Bills and official investigations have been selected on the basis that they contain information as to overall administrative changes. This analysis describes the institutional changes that have taken place in the Swedish moose management administration from the early 20th century to date. In addition, various parties’ arguments for and against changes in formal rules, such as the establishment of MMUs, are analyzed in Chapter 6. As it is common practice regarding the preparation of legislation to utilize an extensive referral system, this provides an opportunity to gain insight into the official view of interest organizations, state agencies, and so on regarding diverse issues.

**Case studies:**

Two counties for comparison of the regional moose administrations have been selected (see Appendix 2 for more detailed information on the variables). The

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dependent variable is the level of adaptivity among MMUs, which is operationalized as the number of management measures taken by the MMUs, the perceived amount of grazing damages, and the goal fulfillment regarding the number of moose/1,000 hectares (see Appendix 2 for more detailed information). These variables were chosen based on the idea that they together capture the concept of adaptive co-management; best of all, the variables can be chosen from the database. In one county, the MMUs exhibited more adaptive co-management features than in the other county. The two cases were selected from the MMU database; they will be called County A and County B here in order to ensure the anonymity of the interviewees. County A is the county with high adaptivity while County B has low adaptivity.

Certain variables are assumed to affect the level of adaptiveness among the MMUs in the counties; therefore, it is critical that these are held constant. One important circumstance is that there should be a mixture of privately and company owned MMUs in the two counties when choosing counties for comparison. As forest companies have a clear objective (i.e., to maximize forest production profits and have employees that manage MMUs), it is assumed that their management procedures will be different than if MMUs are owned by private landowners. Thus, in both counties, there is a mixture of MMUs constituted by both forest companies and private landowners (for further detail on this variable, see Appendix 2).

It is likely that the total number of MMUs in the county and their relative proportion of the total hunting grounds affect routines applied by the public administration relating to their administrative procedures. It is reasonable to assume that, if there are a substantial number of MMUs that extend over a large part of the county, the impact on the regional moose administrative system is greater. There are 37 MMUs in County A and 28 MMUs in County B. In County A, approximately 70% of the total area is constituted by MMUs; the corresponding number for County B is about 60%. Thus, the circumstances are fairly similar.

There are 491 private, 105 company, and 14 mixed ownership MMUs in Sweden. In 10 counties, there are MMUs owned by companies. Only 1% of the private landowners own properties exceeding the size of 400 hectares.

However, as the data collection was performed, one municipality changed counties; therefore, there are two less hunting districts in County A today.
Another factor that might determine the level of adaptivity is how long MMUs have existed. It was possible to establish MMUs as early as 1992, and MMU plans were collected in 2004. It is reasonable to assume that the public administration might improve its management procedures over time and that local resource users will learn over time how to manage moose populations better. Therefore, it is important that this variable be held constant for the two counties. In County B, the average time of existence for MMUs is 6.5 years; in County A, it is 5.5 years.

However, other factors could explain the level of adaptiveness as well; however, due to the fact that there are only 20 counties, it is not possible to find the ‘perfect’ case (for more detailed information, see Appendix 2). Other variables that might affect the level of adaptiveness include the size of the counties, the total number of various license areas, the number of hunting districts, and the number of WMAs. For example, County B is approximately 2.2 million hectares while County A is about 600,000 hectares.

Data Collection for the Case Studies:
The empirical material in the case studies has been collected from three main sources: 1) interviews with regional actors within the moose administrative system, 2) review of documents pertaining to the regional moose administration, such as meeting protocols and statistics, and 3) participant observations at WMB meetings.

In addition, in-depth semi-structured interviews has been conducted with members of the Wildlife Management Boards, CAB hunting administrators, and Swedish Association for Hunting and Wildlife Management (SAHWM sw. Svenska jägereförbundet) hunting consultants in the two counties. Representatives from the SAHWM, Forest Agency (FA sw. Skogsvårdsstyrelsen), Chairmen of WMB, and the forest sector were interviewed in both counties. However, in County A, there were at the time of the interviews no representatives from the Hunters National Association—the Countryside Hunters (NHA sw. Jägarnas Riksförbund–Landsbygdens Jägare) on the board. In County B, the representative from the the Swedish Society for Nature Conservation (SSNC sw. Svenska Naturskyddsföreningen) was interviewed; however,
in County A, the representative from SSNC declined an interview due to the fact that he had been recently appointed. Due to time constraints, only one interview was conducted with a representative from Outdoor Life Association (OLA, sw. Friluftsfrämjandet) in County B and a representative from the Federation of Swedish Farmers (FSF sw. Lantbrukarnas Riksförbund) in County A.

Thirteen of these interviews were conducted in person, while five were interviewed over the telephone due to logistical problems. Altogether, 17 interviews were conducted with actors in the regional moose administration.

A second data source was participant observation at one WMB meeting in each county after the majority of the interviews had taken place.

Other data sources reviewed were WMB meetings protocols, local forums protocols, shooting off statistics, and reports and documents pertaining to the hunting administration in the counties. A more detailed description of precisely what documents were used will be presented in Chapter 11.

**CAB Questionnaire:**
A questionnaire was sent to employees at the hunting sections at CABs in 19 of the 20 counties in Sweden that contain moose. One county did not answer the questionnaire due to the long-term illness of the employee at the hunting section. The total number of employees working with hunting administration tasks in the Swedish counties is about 40 persons; however, only one person at each hunting division answered the questionnaire. The questionnaire consisted of 20 questions relating to subjects such as the administration of MMUs, perceived relationships among actors in the regional hunting administration, the functioning of local forums, and perceived conflict levels in the county (see Appendix 3 for the CAB questionnaire). It is of course critical to remember that the answers are only the opinion of one person in the regional moose administration, and answers to questions, such as perceived conflict level regarding the moose hunting issue in the county, are the opinion of one person. However, it is assumed that the CAB hunting administrators hold a key position in the regional moose administration and is neutral in the sense that they do not represent either
hunting interests or landowner interests. The ideal setup would have been to have had a questionnaire sent to other actors in the regional moose administration, especially the SAHWM hunting consultants; however, this was not possible due to time and financial constraints.

The data retained from the questionnaire were entered into a database. Along with the answers to the questions there was room for additional comments by the respondents—a possibility many chose to utilize. These comments will occasionally be referred to. In two counties, the employees that answered the questionnaire had been recently hired and therefore answered many questions with “do not know.” The information from the CAB questionnaire was utilized as a general background to the status on the national level as well as a reference to findings from the case studies.

**Other Interviews:**

In 2003 and 2004, a pilot study was conducted in Norrbotten County regarding the management of MMUs. In-depth semi-structured interviews were conducted with one district manager and one forest manager employed at the same forest company. A telephone interview was conducted with a hunting team leader who was leasing hunting rights on the above-mentioned forest company hunting grounds.

In addition, an in-depth semi-structured interview was conducted with the chairman of a MMU comprised of three WMAs on private land. Data from these interviews will be used to illustrate diverse angles of issues discussed throughout the thesis. The next chapter will present the historical background of the Swedish moose administrative system.
Chapter 6

THE SWEDISH MOOSE ADMINISTRATIVE SYSTEM: FROM TOP-DOWN TO BOTTOM-UP

The second question posed in this thesis pertains to what characteristics of the public administration might contribute or hamper the development of adaptive co-management systems. Meanwhile, the third question relates to defining how much the structural features of the current moose administrative system differ from an “ideal adaptive co-management administrative system.” In order to answer these questions, it is necessary to describe and analyze the current moose public administration, which in turn necessitates an understanding of the historical development of the moose public administration and what kinds of policy problems the state has been trying to solve with particular types of public administrations.

The first section presents a brief historical background of the establishment of the Swedish moose administration. The main policy problem the state is trying to solve at this time is the collective action problem. In addition, the type of public administration and policies chosen by the state are discussed. The second section discusses new policy problems arising due to the success of the established moose administrative system and how the state reformulated its policy goals regarding the management of moose populations. The state suggested new formal rules to deal with unintended consequences of the system (i.e., large grazing damages that resulted in financial losses for the forest sector). The final section will analyze how diverse actors, such as various state agencies, hunting interest organizations, and forest sector interest organizations debated over suggested formal rules regarding the moose administrative system. This will give insight into potential conflicts among actors on the national
level as it is likely that these exist on the regional level and may in turn affect the possibilities of MMUs developing into adaptive co-management systems. However, the interaction between formal rules and norms will also be discussed, thereby laying the foundation for analysis of the effect these changes in formal rules have had on landowners and hunters. In addition, the role of organizations in affecting their members' responses to the changes in formal rules will be discussed. The next section presents a brief historical background to the establishment of the Swedish moose administrative system.

6.1 Historical Background of the Swedish Moose Administration

Fluctuations in the Swedish moose population and the management system established to deal with this natural resource illustrate in many respects problems associated with common pool resources and human efforts in trying to achieve management systems that allow sustainable resource utilization through collective action. Moose is a typical CPR as it is highly subtractible and exclusion is difficult to achieve; for example, the buffalo moose roams over an extensive territorial space. It is not possible to fence such a mobile resource—at least not without enormous costs. Today 1/3 of the moose population is decimated through hunting; in other words, the human impact on populations is the main cause of death. Therefore, both the problems of high subtractability and exclusion are relevant in the case of moose.

In the following section, a brief introduction regarding the historic alterations of the administrative moose management system will be highlighted to illustrate how the state has successively responded with a range of strategies to a situation characterized as Hardin’s “tragedy of the commons.” These efforts have aimed to achieve collective action in order for the Swedish moose populations to become vital.

In 1789, hunting privileges were abolished, and the right to hunt once again was transferred to the landowner (as was the case prior to 1351). Unregulated hunting resulted in the almost total extinction of the moose population by the middle of the 19th century (SOU 1983: 21:90-101). In fact, by the end of the 19th century, the moose population in Sweden was a good example of the ‘tragedy of the commons.’
Until the end of the 1930s, moose hunting was primarily regulated by the hunting season, which was decided according to the observed state of the moose population. During the hunting season, landowners were permitted to shoot as many moose as they could (SOU 1983: 21:90-101). However, this proved to be an insufficient regulation for increasing the size of the moose population. There was an awareness of the specific problems in managing a CPR by the state. Even the 1912 Hunting Law included a paragraph pertaining to possibilities of voluntary cooperation between landowners in order to achieve agreements as to moose hunting practices (Prop.1938: 46:21). However, this paragraph refers to agreements reached voluntarily between landowners. The reasoning was that, to be able to sustain the moose population, restrictions on rational self-interested actors had to be in place to achieve collective action. It was assumed that a small property owner would shoot more moose than his land could support; moreover, because moose are migratory, it was considered difficult to achieve collective rationality to sustain a viable moose population without cooperation between landowners. The rationale for deciding not to legislate in this matter was that it would not be in agreement with norms and conventions that existed at the time. The legislators recognized the “power” of informal rules and how futile formal rules can be if these are contradictory to informal rules (SOU 1997:91). The CPR problems were described by Harry Hamilton, the national hunting consultant at the Swedish Association for Hunting and Wildlife Management (SAHWM), in a radio speech in 1938.

The continued disintegration of the Swedish land into smaller properties has entailed an increase in the number of hunting rights owner, and as is known hunting rights are connected to property. One of game protection worst enemies is ruthless execution of hunting rights without consideration to wildlife populations’ continued existence. If I don’t shoot the neighbour will, is the reasoning of many, and the consequence has been impoverished wildlife populations (Karlsson, 2005:30).

This quotation illustrates the problems of achieving collective action among rational self-interested actors as well as the devastating consequences this behavior will have on renewable resources such as wildlife populations unless institutions are in place to
prevent such consequences. However, difficulties associated with effective monitoring of hunters and too mild sanctions for breaking laws were also identified as detrimental to the growth of wildlife populations at the time (Prop. 1938: 46:17). Simultaneously, the state was aware of the difficulties in implementing formal rules in order to achieve collective action if these were not perceived as legitimate by people affected by them.

However, in 1938 two measures were taken in order to achieve changes in the wild care and increase the size of the moose populations: the enactment of a new hunting law\textsuperscript{15} and the parliamentary decision to grant SAHWM the public assignment to be in charge of wild care management in Sweden. The Hunting Fund\textsuperscript{16} was also established, which was financed by hunters via a wild care fee (SFS 1938: 279 26§). In the 1938 Hunting Law, the potential to force cooperation between landowners was established. If 4/5 of the property owners who owned at least 4/5 of the properties agreed to the establishment of a Game Keeping Area\textsuperscript{17}, the minority of landowners were forced to join this organization (SFS 1938: 279 10§). The reason behind this change was that voluntary cooperation often stalled due to a few landowners resisting the establishment of Game Keeping Areas (Prop.1938: 46:21)\textsuperscript{18}. Justifications for the restriction in property rights were 1) the fear of extinction of the moose population and 2) the belief that the landowner, in principle, could continue to hunt in the same manner as before (SOU 1997:91).

However, there were reactions to the new Hunting Law. The Hunters National Association (NHA) was established in 1938 as a response to the 1938 Hunting Law\textsuperscript{19}. The main goal of the organization was to promote the interests of

\textsuperscript{15}Lag 1938: 274 “om rätt till jakt”.
\textsuperscript{16}In order to promote wild care, the government can issue directives regarding the obligations of hunters to pay a yearly wild care fee (sw, viltvårdsavgift) (1987: 905 §41). The yearly fee constitutes the Wild Care Fund, and the government decides what the fund is used for (1987: 905 §41). In 2008, the wild care fee is 300 Swedish kronor (1987: 905 §40).
\textsuperscript{17}The Game Keeping Areas changed name in 2000 to Wild Care Areas (viltvårdsområden) when the new law was enacted. SFS (2000:592) Om viltvårdsområden.
\textsuperscript{18}In the official investigation preceding the bill, it was suggested that these areas could be established if only 1/3 of the landowners agreed to the establishment; however, the in bill it was maintained that it was important—as much as possible—not to infringe on landowners’ right of disposition (Prop. 1938:46: 20).
\textsuperscript{19}In 1968, it joined with The Countryside Hunters (established in 1956) and established The Hunters National Association—the Countryside Hunters (NHA).
farmers and landless hunters. “The hunting policy goal of the 1938 Hunting Law was to successively alter the country’s farmers of their right to decide over hunting, on their own property, and simultaneously strengthen the large property owner’s (i.e., the state) and the forest companies’ position of power over Swedish hunting policies” (www.jagarnasriksforbund.se, author’s translation). As discussed in Chapter 2, property rights rules are so-called constitutional rules that restrict lower level rules. The decision to allow for forced collective action signified a restriction in private property rights and was contested by certain groups. If there is a lack of clarity in regards to the content of constitutional rules, it will most likely affect the efficiency and legitimacy of collective choice rules and in turn operational rules. The issue of cooperation among landowners—especially forced cooperation—constitutes the institutional past and continues to affect hunting policies; however, this will be further discussed in Chapter 8.

The official investigation preceding the 1938 Hunting Law discussed how the new policies should be most efficiently implemented. It was argued that the construction of a new state agency dealing with wild care questions was unproductive since, among other things, it was considered necessary to maintain flexibility in decisions regarding hunting errands. Therefore, it was argued that the responsibility had to lie with local authorities. The reason why the CAB should not be responsible for these questions was that the investigator believed it critical for individual initiatives, which—according to him—were embodied in the interest organization SAHWM (SOU 1997: 91:425). Therefore, the official investigator suggested that SAHWM be solely responsible for the administration of moose management and the CAB exert control only via the appointment of an accountant reviewing the activities of the SAHWM County Hunting Association Boards (CHA sw. länsjaktsvårdsföreningar) (Prop. 1938: 46:28). However, the minister stated that the existing system would remain until the SAHWM had proven it could provide knowledgeable and impartial management of wild care. Therefore, CABs would continue to handle hunting commissions, according to the minister. However, SAHWM would be financed by the Hunting Fund (Prop. 1938: 46:27). An official investigation in 1950 concluded
that the SAHWM had received almost all the revenues from the Hunting Fund and that the organization had fulfilled the requirements that the minister laid out in 1938. Therefore, a new parliamentary decision renewed SAHWM’s assignment to be in charge of wild care in Sweden (SOU 1997: 91:432).

The SAHWM is both a professional and voluntary organization. The professional staff includes the hunting consultants employed by the organization. From 1939 to 1940, SAHWM hired 19 hunting consultants who were placed throughout the country (Lundvik, 2005:10). The voluntary part of the SAHWM is constituted by the County Hunting Associations (CHA) located in each county in Sweden (SOU 1983: 21:128–130). These are in turn compromised of hunting districts (sw. krets) that roughly correspond with municipality borders.

In the beginning of the 1940s, a new Hunting Law was enacted. An interest organization was given the official responsibility to be in charge of wild care in Sweden. SAHWM also received funds to accomplish this objective and hired staff in order to promote a growing awareness of the importance of collective action among hunters in order to ensure viable wildlife populations. The state chose a corporate arrangement for the implementation of moose policies, but the fact that the CABs were involved denoted that characteristics of the legal-rational bureaucratic model were present as well.

In the 1950s, changes in the Swedish forest production included extended clear-cutting of forests, introduction of new forest plants, and a proportionately larger share of plant and young forests. All these changes contributed to larger moose populations as moose prefer grazing on new plants and large clear-cut forest areas provide more food than old forests do. At the time, there were also small populations of brown bear and wolf, which are predatory animals that feed on moose (SOU 1990:60:26). In other words, ecological prerequisites for the growth of the moose population were in place in the end of the 1950s. Despite the fact that the ecological conditions were good for a population increase of moose and that there was now an administrative system in place to promote collective action among hunters, the moose populations in Sweden did not increase considerably until the end of the 1970s.
License hunting was introduced in the beginning of the 1970s. The license hunting system was not uniform throughout Sweden, but in principal license hunting means that the CABs register properties of a certain size and decide, prior to the start of each hunting period, how many moose can be shot—a number determined by various factors including the size of the moose population and the productivity of the land (SOU 1990: 60-101). Smaller properties could be registered as general areas. The hunting rights owner could shoot one adult moose and one calf on the general areas; however, the hunting period lasted only a few days. License hunting was conducted on approximately 95% of moose land by the beginning of 1990s (Prop. 1991/92: 9:41). These kinds of rules are precise and general and are typical characteristics of the legal-rational bureaucratic model.

The main reason for the unprecedented increase in the moose population was changes in the moose management system, such as license hunting. In some counties, hunting practices also contributed to rapid growth in the moose population. For example, the percentage of calves shot increased in order to save productive cows, thereby raising the productivity of the moose population. The increase in calf shooting off also contributed to a higher average age of the moose population and, in turn, its growth (SOU 1990:60:26). These specific hunting strategies could be implemented due to the fact there was now an extensive administration in place and an interest organization that could inform hunters how to increase moose populations. This was a great contrast to the situation at the end of the 19th century, when there were no institutions in place to stem the individual rationality of the self-interested hunter.

Until the early 1980s, the Swedish moose management system had been characterized by growing cooperation among landowners and efforts to increase the historically weak moose population. However, by the late 1970s and early 1980s, Sweden experienced historically large moose populations—the largest on record. Despite increased hunting, the moose population continued to grow. The moose shooting off increased from 50,000 in 1975 to over 150,000 by the early 1980s, as is illustrated in Figure 2. A third of the moose population is decimated through hunting every hunting season (SOU 1990:60:26–28).
In the 1980s, the goal of achieving a vital moose population had been reached. The state had succeeded in increasing moose populations through an administrative system that regulated moose hunting in detail throughout the nation. This was a top-down management system in that the number of moose to be shot was decided on the regional level and not by landowners, as had been the case prior to the construction of the administrative system. It can also be defined as a conventional resource management system as the management goal was to achieve maximum sustainable yields of the resource. Hunting practices conducive to population growth were introduced in order to increase the size of the moose populations. In addition, it was a single-species management system since it was solely focused on managing one resource (i.e., moose). No consideration was given to other variables in the ecosystems. There was no ecosystem management at the local, regional, or national level at the time. The state opted for a corporate arrangement when declaring SAHWM to be responsible for the wild care by parliamentary decisions and by funding the organization. However, this system caused new problems, which will be discussed in the next section.
6.2 **Problems Occurring and New Policy Intentions**

An administrative system had been built up that entailed detailed regulation of hunting practices; the main actors in this system were the interest organization SAHWM and the CABs. Ultimately, the success of the administrative system led to its questioning due to two main factors: the high costs for the top-down, centralized, and detailed regulated system and the financial losses it inflicted upon the forest sector.

The procedures for the applications of registering of property as hunting grounds meant that the CABs had to make sure that all information, such as the size of the property, property designations, and applicants’ hunting rights, was correct. Many times there were mistakes in the applications, creating a time-consuming procedure (EPA report 1990:4). In addition, hunting grounds large enough to be registered as so-called A-license areas (large enough to permit shooting of one moose and one moose calf each year) had to be allocated a moose quota each year. The procedure for allocating moose quotas differed somewhat between the counties. However, as a rule, the CABs requested the opinion of the SAHWM hunting consultants and SAHWM County Hunting Association (CHA). These suggestions were then turned over to the Wildlife Management Board 20 (WMB sw. viltvårdsnämnden) that in turn provided a recommendation for the CAB regarding the size of quotas A-license areas should receive in the upcoming hunting season within each hunting district. Each county had and still has a WMB, where diverse interests are given an opportunity to offer their views and add expert knowledge before major decisions are made by the CAB. Thereafter, the CAB made a preliminary decision on quotas, which was sent out to the representatives of each license area, which had the opportunity to make comments on the allocations prior to the final decision of the CAB (Prop. 1991/92: 9: 35). The CABs’ decisions regarding the registering of hunting grounds as license areas and quota allocations could be appealed at the EPA. The EPA received approximately 600 appeals per year pertaining to such decisions made by the CABs throughout the country (EPA report 1990:8).

20 It was first established in 1982, but was initially called the County Moose Board (sw, Länsälgsnämnd).
This system had many of the characteristics of the legal-rational bureaucracy model, such as the general and precise rules for registering of properties as license areas and the quota allocations. In addition, the fact that the system of appeals was comprehensive and frequently used indicates that it might have been necessary in order to ensure legitimacy for the system. In a report of the moose administrative system, the EPA stated, “The ambition appeared to be to create absolute precision, fairness and democracy” (EPA report 1990:12). As discussed in Chapter 4, conventional resource management can be implemented by a legal-rational bureaucracy as, for example, flexibility is not as critical as in adaptive co-management systems. This system implied a costly administrative structure but was not the only problem.

The large moose populations in the middle of the 1980s caused major grazing damages to commercially valuable tree species, such as pine, which meant valuable economic losses to the Swedish forest industry—an important export sector of the Swedish economy. One cost included reimbursement to the forest and agricultural sectors for grazing damages. Hunters pay a fell fee to the CAB for each moose they shoot. These fell fees constitute the Moose County Fund21 (sw. älgvårdsfond). Part of this fee is intended to cover the costs of grazing damage by wildlife, while another part is to be utilized for wildlife care efforts. The fee has been raised over the years, as grazing damage has increased, so that an increasing proportion has been directed toward reimbursement for grazing damage22 (SOU 1990: 60: 57). It was argued that the grazing reimbursement system lacked incentives for active preventative actions (i.e., increased shooting) (SOU 1990: 60:40). In other words, not only had the explosion of the moose populations throughout the country caused financial losses to

21Each county has a moose county fund established by the fell fees paid by hunters (1987: 905 §52 a). For a mature moose that is felled, the hunting rights owner has to pay a fee that is decided by the CAB in accordance with EPA directives (1987: 905 §52 b). The CAb$s can use the fund to leave contributions for the administrative costs—for example, the register of hunting areas of moose (1987: 905 §52 d p.1)

22There also have been significant differences among various parts of the country with respect to these reimbursement costs. Hunting interests in the northern part of the country have criticized this system because their fees have been transferred to areas in southern Sweden with more extensive grazing damage (SOU 1990: 60: 57).
the forest sector, the existing rules aggravated the situation. As a result, there were no incentives to decrease the moose populations. However, the grazing damage reimbursement system was not the only flaw in the administrative structure aimed at dealing with overly large moose populations.

The problems caused by the administrative system were highlighted in the bill proposing the new Hunting law in 1987. It was not until 1987 that the forest sector could appoint a representative to the WMB (Prop. 1986/87: 58:65). The reason for adding a representative from the forest sector was due to the serious consequences that grazing damages by moose caused the forest industry.23

Another change suggested in the official investigation was the establishment of voluntary local forums comprised by landowners, hunters, and other persons interested in nature questions. The local forum sought to coordinate wild care efforts on the local level (SOU 1983: 21:329). It was argued that a forum for discussion and planning might motivate those hunters and landowners who showed too little interest in becoming more active. It was stated that the local forums could establish wild care programs and utilize Forest Agency (FA) forestry consultants’ competence in order to estimate grazing damages. It was emphasized that these should be voluntary and separate from the SAHWM organization (Prop. 1986/87: 58:64-65).

Alterations in the moose administrative system that took place in 1987 included the establishment of local forums, comprised of diverse interests, and the decision that the forest sector would have a representative on the WMB. These changes indicated a growing awareness of the state of the importance of incorporating the forest sector in the administrative system of moose due to the increasing level of conflict. This also signified a change in single-species management of moose to include the effects on another variables in the ecosystem. However, it still focused on achieving maximum sustainable yields (MSY) even though goals were conflicting (i.e., large MSY of moose mean decreased MSY of timber). This was the beginning of a changing structure of

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23In the bill, unlike the preceding official investigation, it was recommended that representatives from the agricultural sector and the Forestry Agencies (FA) still be members of the board (Prop. 1986/87: 58:65).
the administration from being handled by the CABs and primarily SAHWM to
include the other major interest—namely, the forest sector.

However, these changes were not considered sufficient for dealing with the
costly administration and substantial grazing damages. Therefore, the government
decided that the EPA should suggest ways to change routines and decision-making
procedures at CABs with respect to moose management (Prop. 1991/92: 9). The
government also initiated an official investigation into the grazing damages caused by
moose and measures that could be taken to alleviate these problems24.

The policy goals in the government bill, following the EPA report and the
official investigation, sought to 1) increase the influence of the landowner and reduce
the size of the moose populations and 2) decrease the administrative costs and detailed
regulation. The policy changes suggested that local forums should be strengthened, the
grazing damage reimbursement system abolished, and the possibility to establish

As previously discussed, depending on their role in society, organizations might
be able to exert more or less influence over political decisions. One way for
organizations to exert influence is by participating in the system of referrals, if
opportunity is given. In the following section, the different views held by affected
state agencies, CABs, and interest organizations regarding suggested changes in formal
rules are analyzed through comments made on bills that—among other things—
suggested the establishment of MMUs25.

24The official investigation stated that the moose policy in the upcoming years should be focused on
reducing the moose populations locally due to the fact that these had increased significantly in certain
areas during the previous years. It was also suggested that the grazing damage reimbursement system
be abolished in order to promote increased shooting of moose. In addition, it was proposed that an
organized local cooperation in the hunting districts between hunting and forests/agricultural interests
take place. The local forum was to establish a plan wherein the grazing damage situation was
described; the plan was to be presented to the WMB on a regular basis (Prop. 1991/92: 9 Bilaga
1p.54). Both the EPA report and the official investigation suggested that landowners and hunters be
able to establish MMUs and decide the moose shooting off on their own (Prop. 1991/92: 9: 53
&198).

25The following analysis is primarily based upon proposition 1991/92:9 and the preceding official
investigation as well as the EPA report that suggested changes in the moose management system to
alleviate the problem of excessive grazing damage and administrative costs.
6.3 BARGAINING ON THE NATIONAL LEVEL

In this section, the official views of various organizations and state agencies of changes in formal rules will be analyzed. In addition, the eventual consequences of these changes for landowners and hunters incentives to alter their behavior will be discussed. This section begins with a brief description of organizations and separate sections of the state’s comments on the bills. Thereafter, their view is analyzed in regards to the grazing damage set of problems, the establishment of local forums, the establishment of MMUs, and finally the view of landowners and hunters. This section concludes with an analysis of what the changes in formal rules imply for all relevant actors, such as landowners, hunters, and organizations.

Changes in the formal rules in a society are a process between the state and powerful interest groups (Knight, 1992; North, 1990). The main bargaining partners concerning the Swedish moose administration, besides the Swedish state, are the hunting interest organizations, the forest and agricultural interest organizations, and nature interest organizations. The largest hunting interest organization is the SAHWM; due to its semi-official position, it has power to influence wildlife policy. However, it is extremely difficult to judge the relative power of the forest industry versus hunting interests. The forest industry is an important export sector in Sweden and has powerful economic influence. In addition to the SAHWM, another hunting interest organization exists: NHA, which has fewer members and focuses on landowners with smaller properties. The Swedish state cannot be viewed as a unitary actor as certain state agencies, such as the National Board of Forestry (NBF)\textsuperscript{26}, have a greater variety of views of moose management than for example the CABs.

All bodies to which the proposed measure of changes in the moose management system was referred for consideration agreed on the existence of large-scale grazing damage. However, opinions on the extent of this damage and which measures to use to reduce it differed among state agencies, the CABs, and diverse interest organizations. It also seems that the concerned parties had different

\textsuperscript{26} The National Board of Forestry changed its name in 2006, when all the eleven Forest Agencies merged into one authority.
expectations concerning the outcomes of certain changes in the moose management system. The Swedish EPA, the NBF, the State Forest Company (SFC sw. Domänverket27), and the CABs all commented on the bill. The hunting interest organizations—SAHWM and NHA—as well as several interest organizations representing the forest and agricultural sectors also commented on the bill. The next section will discuss the grazing damage set of problems.

**Grazing Damage:**

There were differing opinions about the seriousness of grazing damage and how to alleviate this. The NBF and SFC considered the grazing damage momentous and felt that the primary measure taken had to be a severe reduction of the moose population at the national level. The EPA was of the same opinion as the NBF and SFC; however, contrary to the other two state agencies, it emphasized the difference between the biological-carrying capacity of the forest to feed wildlife and its economic-carrying capacity with respect to grazing damage to the forest and agricultural sector and to traffic. The EPA stated that the biological-carrying capacity was two to three times higher than the economic-carrying capacity and that actors at the local and regional levels had to decide what definition they utilized when deciding the size of the moose population. This demonstrates that the NBF and SFC primarily represented forestry interests, while the EPA seemed to take a somewhat “neutral” stance. The NBF stated that the forest industry is an important export sector, while hunting is a hobby—although of great significance. The view of the government, as expressed in the bill, was that a shooting off range of 150,000 –200,000 moose per year, over a three-year period as suggested by the official investigation, was too general and that consideration had to be taken regarding local conditions. One of the reasons for this failure in keeping the moose population at acceptable levels was inadequate knowledge of the size of the moose populations, resulting in excessively

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27 Domänverket was an official state agency established in 1859 with the main assignment of managing state-owned forests. It was transformed into a state company in 1992 called DomänAB. In 2001, it was taken over by Sveaskog AB, which is owned entirely by the Swedish state and is the biggest owner of forests in Sweden, managing 4.5 million hectares of land.
general local quotas inappropriate for the actual situation as well as poor cooperation between landowners and hunters (Prop. 1991/92: 9:1-24).

Although the hunting interest organizations agreed that grazing damages were significant, they also emphasized that, in many areas of the country, the moose population was weak, and countrywide hunting policies, as suggested by the official investigation, were inappropriate. The SAHWM also emphasized that measures had to be taken by the forest and agricultural sector to alleviate grazing damage by adjusting forest production and choices of agricultural production. They further argued that hunters should build wildlife fences and establish wildlife feeding areas to alleviate grazing damage.

The forest industry has made it quite clear that the industry’s raw material interests should be the guiding principle for wildlife policy (Prop. 1986/87:58:137). Forest and agricultural interest organizations were of the opinion that actual grazing damage was higher than what had been reported by the official investigation and that a rapid reduction in the moose population was the answer to the problem. The NBF stated that only limited measures could be taken by the forest sector in increasing wildlife feed and that this only made sense when the moose population was in a state of balance.

All the state agencies, as well as the forest and agricultural interest organizations, were of the opinion that the grazing damage reimbursement system did not provide incentives to keep moose populations in check. However, the SAHWM considered that continuation of grazing damage reimbursement should be considered for landowners of smaller properties. The agricultural and forest interest organizations emphasized that removal of the grazing reimbursement system had to be accompanied by real influence for landowners to decide an appropriate size of the moose population. One way for landowners to gain a greater influence was through participation in the so-called local forums, which will be discussed next.
Local Forums:
The establishment of local forums was first suggested in bill 1986/87: 58; these were later encouraged to be strengthened via bill 1991/92: 9. The local forums are organizations where forest and hunting representatives negotiate over moose allocations and the hunting period in the various hunting districts. These suggestions are turned into the Wildlife Management Boards in each county. The EPA, several CABs, and SAHWM County Hunting Associations (CHA) did not approve of the establishment of local forums on the grounds that these were superfluous as the tasks were already performed by the existing organizational structure (i.e., the SAHWM and its CHA) (Prop. 1986/87: 58). For example, many of the CABs were concerned that confusion would arise as to what assignments the CHAs would have in relation to the local forums. The EPA could not see the purpose with local forums and rejected the suggestion. The SSNC argued that it would be important that all participating organizations have equal representation in order to prevent domination of hunting interests (Prop. 1986/87: 58:240). NHA stated that both the hunting interest organizations should be equally represented in the local forums. The SAHWM believed that local forums could be arranged by the organization and be part of their county hunting districts (Prop. 1986/87: 58:240).

The official investigation from 1990 suggested that the local forums be arranged within the CHAs’ organizational structure (SOU: 1990: 60). The NHA protested this suggestion and stated that equal representation of their organization in the local forums was a non-negotiable demand (Prop. 1991/92: 9:145). According to the NHA, this was the first time ever that consensus had been reached between the two hunting interest organizations as well as affected official authorities (Prop. 1991/92: 9:209).

The Federation of Swedish Farmers (FSF) and Forest Owners’ National Association argued that it was critical that landowner interests be ensured a strong position in the local forums (Prop. 1991/92: 9:146). SAHWM believed it important for increased cooperation between hunters and landowners but that it should not be formalized and could vary between counties (Prop. 1991/92: 9:148). The Swedish Landowner Association stated the following: “hunting is an integrated part of the
economic management of the land that is decided by the landowner, and there is therefore no need for an obligatory local forum” (Prop. 1991/92: 9:149 author’s translation). However, the most important change in formal rules was the decision to allow for the establishment of MMUs, which will be discussed next.

**Moose Management Units:**
The suggestion to abolish the grazing damage reimbursement system accentuated the importance of keeping moose populations down. It was emphasized strongly in the government bill that landowners in the current system had a difficult time ensuring that their interests were taken into account.

It cannot be overlooked that local imbalances in the moose populations reflect a real conflict of interest between hunting and forest interests. There is a risk that the problems are transferred to the local level without any direction as to how to solve them; therefore, it is critical that agricultural and forest interests have actual influence. The problem does not only concern the issue of reaching a common goal as to the size of the moose population, this goal also has to be realized (Prop. 1991/2: 9:23, author’s translation).

All the interest organizations supported the establishment of MMUs, but those promoting agricultural and forest interests indicated how important it was that landowners actually achieve the level of influence suggested by the official investigation. The SAHWM stated that it supported the MMU model, but pointed out that it was necessary to have some form of binding agreements for members of an MMU and some form of regulations regarding the actions of the MMU; thus, it offered to write standard agreements and stipulations. The SAHWM claimed that it was critical to ensure that the already established cooperation among landowners not fall apart (Prop.1991/92: 9:177). In contrast to the EPA, the SAHWM was also concerned that smaller hunting areas would have a negative impact on moose populations.

The NBF approved the establishment of MMUs and stated that well-established hunting areas should be able to decide the number of moose shot. The NBF also claimed that the moose management plan could be utilized to systematically evaluate
the moose population and grazing pressure. It further argued that an administrative system that involves prolonged proceedings and time-consuming discussions among landowners, public authorities, and hunting interest organizations had to be avoided and that the landowners’ influence had to be strengthened to a higher degree than what was apparent from the bill.

Some of the CABs opposed the establishment of MMUs as they believed that the purpose of the MMU was met by “extended licenses” already in place. Another argument against the establishment of MMUs was the view that the current system of state-regulated quotas that had been decided after consultation with diverse interest organizations was the best system to ensure a balanced moose population. One CAB pointed out the importance of the public retaining the power to steer the moose population, based upon wildlife traffic accidents and grazing damage. In addition, one CAB stated that, if a few single large landowners could hunt without some external control, it would likely be offensive to people. Some CABs pointed out that, due to the fragmented ownership structure in their respective counties, the MMUs as an organizational form would not become widespread. The majority of the CABs stated that the establishment of MMUs was something for which hunters were already prepared, as evidenced by the “extended licenses.” They also considered this step to be a natural development and a responsibility that hunters could handle. In the next section, the views of landowners and hunters of the diverse organizations will be discussed.

Landowners and Hunters:
Views of the roles of hunters and landowners differed somewhat. The NBF reacted to the EPA’s description and the ambiguity regarding hunters and landowners because these often are not the same persons. This unclear distinction obscures the fact that these two actors usually have conflicting interests. The NBF stated that, for obvious reasons, hunters usually are more tolerant of grazing damage to young pine forests than landowners are. Due to the significant economic affect of grazing damage, it should be the landowner who has the right to decide the number of moose shot,
according to the NBF. All the agricultural and forest interest organizations stated that it must be landowners who decide the size of the moose population and that the hunters should be obligated to shoot the set quota. One forest interest organization stated that, considering the great economic impact of hunting, there is no room for a “special” hunting interest and, consequently, hunting interest organizations should not be permitted to represent hunting interests before the authorities.

The SAHWM was upset over the EPA’s deprecatory description of hunters in general, claiming that they had a difficult time handling documents and maps. The SAHWM also pointed out the importance of establishing rules that hunters found meaningful and stated that, in its experience, it was difficult to achieve a system to which all hunters could agree. Nonetheless, the organization also emphasized that most hunters are loyal, but expect the moose hunting administration to be fair. In the next section, the implications of the changes in formal rules will be analyzed.

**Implications of changes in formal rules on organizations and local actors:**

In this section, the positions taken by diverse organizations and state agencies regarding the changes in formal rules will be analyzed. It will also analyze how their roles in the moose administration might alter as a consequence of these changes and measures that they might take in order to pursue their interest within these new rules. In addition, this section contains an analysis of how these changes in formal rules might affect the incentives of landowners and hunters as well as whether there might be norms inhibiting the realization of these new formal rules. Figure 3 depicts the interconnectedness between formal and informal rules as well as also the role of organizations in affecting changes in formal rules with respect to the described changes in the Swedish moose management system.
Changes in formal rules have been made through the establishment of MMUs, the abolishment of the grazing damage reimbursement system, and the establishment of local forums (as is illustrated by the upper box in Figure 3). The possibility of establishing MMUs is an action that can be taken on the local level by hunting rights owners while local forums provide an arena for landowners and hunters to influence the size of the moose populations on a higher jurisdictional level as these correspond with hunting districts, which in turn are roughly equivalent to the municipality borders. The local forums can be a ‘tool’ for landowner interest organizations and large forest companies to influence the size of the moose populations by appointing representatives to the local forums.

Figure 3. Changes in the Swedish Moose Management System.28

28 The figure is inspired by Nee and Ingram (2001)
Changes in formal rules directly affect the incentives of individuals and small groups (as is illustrated by the arrow on the right-hand side). Hunting rights owners can, by establishing MMUs, decide how many moose to shoot; thus, their incentives have changed drastically. In addition, the fact that the grazing damage reimbursement was abolished increases incentives for landowners to keep moose populations down. The question then becomes: What effect does this have on the norms and relationships between the various groups and individuals (depicted in the lowest box in the figure)? Who should decide the size of the moose population? The groups differ in who they think should carry this right. If hunters believe that they have a right to participate in decisions concerning the size of the moose population, an organizational form such as the MMU results in contradictions between formal rules and norms as it implies that landowners have the right to decide the number of moose shot.

For example, one CAB stated that it might be offensive to many if a few large landowners decide the size of the moose population. Another issue directly related to the question of legitimacy, and also frequently raised, is that of the hunters actually shooting their quota of moose. Hunters can ultimately affect the size of the moose population by not filling their assigned quotas, irrespective of who generated these numbers. One of the advantages of local resource users defining, implementing, monitoring, and enforcing rules is that it is easier to detect deviations from rules (Ostrom & Schlager, 1996). This, on the other hand, is more difficult for a forest company. As Knight states, difficulties in establishing new rules relate to changing expectations; in other words, people have to be convinced that other people will also follow the new rules (Knight, 1992). Regarding natural resources, this is a question of who has the right to decide the level of use and state of natural resources—a question which often uncovers deep-seated beliefs and values. As is apparent from Table 1 (Chapter 2), the responsibility of private landowners is to avoid unacceptable use of resources; however, what is deemed ‘unacceptable’ constantly changes. The concern that landowners would actually gain the right to decide the moose populations in MMUs was expressed by the landowner interest organizations. They of course are
dependent on the hunters to a certain extent even though the relationship is characterized by mutual dependence.

However, yet another perspective of this issue is whether the formal rule allowing for the establishment of MMUs has led to the intended policy changes. As it is the hunting rights owner\(^{29}\) that can establish MMUs, it is possible that it is hunting interests that actually dominate management activities in the MMUs. If this is the case, the policy intentions of the state have not been realized. This question will be further discussed in Chapter 11.

Organizations (described in the middle box) affected the changes in formal rules by participating in the referral system (which is illustrated by the arrow pointing upwards from the middle box to the top box in Figure 3). The actors who ‘bargained’ over the changes in the formal rules were the state agencies, hunting interest organizations, nature interest organizations, and agricultural and forest interest organizations. However, it is extremely difficult to judge the influence of interest groups over these processes, especially as none of the interest groups were clearly opposed to the suggested changes. It became clear that there were divergent opinions about the size of the moose population and the measures to take in order to decrease grazing damage.

The Swedish state cannot be considered a single actor, as revealed by comments made by various state agencies and the government. “Thus, the State consists of numerous authorities and agencies that might be associated with different groups and functions of the resource system” (Carlsson & Berkes, 2005). For example, the NBF primarily represented the forest industry, while the EPA seemed more neutral on the issues. Since the NBF is also represented in the WMB it is interested in finding out whether the representatives pursue the forest sector interests in this regional moose administrative forum; this question will be further discussed in Chapter 11.

It also became clear that NHA was eager to play a greater role than it previously had in the moose administrative system as it put forward the demand to be equally

\(^{29}\) “Application of registering of moose management area,….and licence area for moose hunting shall by hunting rights owner…. be handed in to the CAB in County were the area, or larger part of it is located” (EPA 2002: 19 §2).
represented in the local forums. The SAHWM had a greater influence over regional moose management issues since it had been granted the official responsibility to lead wild care in Sweden; however, NHA challenged this when demanding a greater influence.

Forest industry interest organizations highlighted the problem of increasing grazing damages as well as problems with the existing institutional framework, such as overrepresentation of hunting interests in the Wildlife Management Boards. One problem has been that hunting interests have dominated the WMB and the same general attitude that exists among hunters—not to “overtax” the moose population—has been in the majority in the WMBs. The reason is that forest industrial representatives often hunt themselves and, therefore, represent the hunting interests to a higher degree than that of their employers, the forest industry. This problem has been highlighted by forest interest and agricultural interest organizations. Although the composition of WMBs is regulated by law, the unanticipated consequence has been overrepresentation of hunting interests, which is to have exacerbated the problem of moose grazing damage (SOU 1990: 60:46; Prop. 1991/92:20). The University of Stockholm and the Swedish Society for Nature Conservation (SSNC) stated that it was of importance that the hunting and forest sector not dominate the WMBs but have equal representation with these interests and the nature interest in response to a bill suggesting increased forest industry representation on the WMB (Prop. 1986/87: 58:237&240).

Although there was no greater conflict between the hunting and forest interests with respect to the changes in the formal rules, it was clear that views differed as to who should decide the size of the moose population. The reason for this low level of conflict was probably, in part, due to various interpretations about the importance of the changes as well as, in part, due to the stance taken by the government. Those promoting forest interests strongly expressed the view that the landowner had to have the final say over the size of the moose population. Some landowner interest organizations even claimed that there was no room for a separate hunting interest as the size of the moose population was purely a decision for the owner of the land.
Interest organizations can also affect their members’ responses to changes in formal rules (as is illustrated by the arrow pointing downwards from the middle box to the bottom box in Figure 3). For example, the establishment of local forums provides the forest sector with an opportunity to influence the size of moose allocations; however, it is also critical that the organizations inform and encourage their members to participate in the forums. It might be difficult for forest sector representatives to pursue their interests in the local forums due to the fact that the SAHWM representatives have greater bargaining power as they have previous experience and provide the local forums with inventory material. Another potential problem might be that it is perceived negative in some communities with small moose populations; thus, representatives in local forums might be cautious to express demands for lowering moose populations in order not to risk being punished for breaking norms. This issue will be further discussed in Chapter 11.

The interest groups and many of the CABs did not seem to believe that being able to establish MMUs would lead to any drastic changes. Because it is voluntary to join an MMU and a management plan has to be handed in to the CAB, landowners obviously find this management system attractive. Today, the system covers approximately 12 million hectares (SOU 2007:63:5). The reason for this support must be the opportunity it gives various individuals to have a say in deciding the number of moose to be shot in their local area. In the pilot study conducted in 2003, both an interviewed forest manager at a large forest company and the chairman of an MMU, comprised of three Wildlife Management Areas (WMA), considered this management system to be excellent. The chairman stated that the greatest benefit of the MMU was that decisions were made by hunters, not the CAB (interview 2). The forest manager stated that MMUs were the best management system for moose. He also said that they could blame no one for the situation as it was their responsibility to determine the size of the moose population (interview 1). It appears that all the bargaining partners underestimated how widespread this management system would become and how important landowners believe it is to possess management rights with regards to moose
management. However, whether hunters and landowners are successful in managing moose populations will be discussed in Chapter 9.

To summarize, it seems fairly safe to state that the changes suggested in the bill proposing the establishment of MMUs can be characterized as the result of a bargaining situation among assorted interests and that the state agencies clearly bring out arguments to support their specific interests. For example, the NBF is clearly more concerned with keeping moose populations in check due to the financial losses the forest industry suffers than the EPA appears to be (Prop. 1991/92:9). As has been described in previous sections, the moose administrative structure designs have altered in such a way as to accommodate bargaining between the two major interests at all levels. A pertinent question is whether the regional administrative structure can deal with achieving some sort of balance between these two conflicting interests. This will be discussed in Chapter 8; however, in order to do so it is necessary to understand the existing administrative structure. In the next chapter, the current moose public administration will be described in detail.
Chapter 7

**THE CURRENT MOOSE ADMINISTRATIVE SYSTEM**

As discussed in the previous chapter, many changes have been made to the Swedish moose administrative system since it was first established in the beginning of the 20th century. In this chapter, the current moose administrative system will be described in detail. The structure of the public administration, the local forums, the ownership structure, various license areas, local moose management organizations, and MMUs will be presented.

The parliament in Sweden enacts laws pertaining to wildlife and hunting; the main laws are the Hunting Law (Jaktlag 1987:905) and Wildlife Management Areas Law (Om viltvårdsområden 2000: 592). The government has also enacted ordinances regulating hunting in more detail—namely, the Hunting Ordinance (Jaktförordningen 1987: 905). The wild care and hunting in Sweden are affected by international conventions such as the Convention on Biological diversity and the EU Habitat directives. The environmental department in Sweden is responsible for the implementation of these conventions; the EPA falls under the environmental department. It is also the EPA that issues directives regarding wild care and hunting. However, it is the Agricultural department that is responsible for hunting and fishing.

At the national level, the EPA is the supervising public authority for the management of wildlife. With respect to this function, the EPA issues directives and general advice. It also formulates plans to protect endangered species and manage wild animals that cause damage. Regarding its role in relation to MMUs, decisions at the CAB to reject an application to establish a MMU can be appealed to the EPA (see
Figure 4) (1987: 905 §58 p.1). The EPA’s directives contain regulations and general advice pertaining to the establishment of MMUs (NFS 2002:19).

The County Administrative Board (CAB) is the supreme public administrative authority in each county. The CAB plays a critical role in implementing wildlife policy. The CAB grants permission for many activities concerning hunting and wild care. The CABs register hunting grounds as diverse license areas and keep register of these. The CABs also make the final decisions on moose quota allocations and the length of the hunting period for license areas in the county, as illustrated in Figure 4. They decide on the establishment of Wildlife Management Areas (WMA, sw. viltvårdsområden) and MMUs (Prop. 2000/01:73:73). They are also in charge of revising MMUs plans and according to EPA directives are advised to do so every third year (NFS 2002:19).

Figure 4. The Swedish Moose Management System.

The hunting and wild care questions were handled by the judicial divisions at the CABs in the 1980s; this was criticized in an official investigation. It was maintained that wild care is an “environmental issue” and therefore should be placed under the
environmental division and the judicial division should be asked for judgment on judicial matters only (SOU 1983: 124-126). The EPA maintained that hunting issues should be handled by the environmental divisions at the CABs; however, it was considered critical that the lack of competence relating to these issues be remedied (Prop. 1986/87: 58:228). Hunting and wildlife questions are still handled by the judicial divisions in some counties in Sweden today, such as Södermanlands County and Östergötalands County. In County B in the case study, the hunting questions are placed under the so-called public administration division and not the nature division.

A consultative body, WMBs in each county were established in 1982, although at that time they were called County Moose Boards. It was stipulated that the boards be an advisory body to the CAB in questions relating to moose care and moose damages. The representatives on the board came from the county agricultural board, Forest Agency (FA), two from hunting interest organizations, one from a nature interest organizations, and one from an outdoor life interest organization (SFS 1982: 319: §7 2 mom.). In 1987, the name changed to the Wildlife Management Board (WMB). The WMBs are regulated by law, by which their primary responsibilities and organizational structure are stipulated. The WMB board has eleven members from various organizations. The WMBs address issues of an overreaching and principal nature (NFS 2002:19 29§ p.2). In addition, the board is allowed to call in experts at the board meetings (SFS 1987:905 46§). The SAHWM hunting consultants are called in as experts at the WMB meetings. According to EPA directives, each year, the board should address how the local forums have worked and what results have been produced by these. The results from the local forums should be the basis for the recommendations of the board to the CAB regarding the goal for the management of

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30 A questionnaire was sent out to seven CABs in the country (SOU 1983: 124-126).
31 Two are political appointees, one representative from FA, one from an outdoor life interest organization, one from a nature interest organisation, two from the hunting interest organizations, one representative with special knowledge of traffic safety, and three representatives from landowner interests organisations. This structure of the WMB entail that hunting interests have two votes (NHA one and SAHWM one vote) and the landowner interest organizations have three votes. The FA also has one vote on the WMB and, as became evident in the bargaining section, at least on the national level, this state agency pursued the interests of the forest sector (SFS 1987:905 46§). In Jämtland, Västerbotten and Norrbotten counties the reindeer owners have a representative on the board.
the moose populations, as is illustrated in Figure 4 (EPA 2002:19 29§). The CAB should also confer with the WMB regarding the principles that should be applicable for the registration of MMUs (NFS 2002: 19).

In 2000, it was decided that the chairman and vice chairman of the WMB would be political representatives nominated by the county council and appointed by the CAB. It was considered important that the chairman represent public interest and not a special interest as it was assumed that there would be conflicting interests in the WMB (Prop. 1999/2000: 73:82). Many of the CABs did not approve this change and considered it a matter to be decided by the CABs (Prop. 1999/2000: 73:82).

**Local forums:**

Local forums are today established throughout the country and correspond with the geographical borders of hunting districts, which in turn roughly correspond with municipality borders. The hunting interest organizations together with the forest and agricultural sector have made agreements on the national level as to the organization of the local forums. The composition of the forums can vary depending on local circumstances, but the hunting and forest interests should be equally represented. In addition, experts can be called in, and the FA should always be called. The hunters are responsible for providing fell statistics, monitoring results, judgments of the size and composition of the moose population, and results from deliberations with A-license areas and MMUs. The landowners and FA shall provide information about the grazing damages and changes in the forest production. The local forum should establish a moose management plan for the hunting district, that contains goals regarding the size and composition of the moose population. The local forum should suggest moose quotas, hunting principles, hunting periods, and so on and report this in a protocol. If there are diverging opinions, they are to be accounted for clearly in the protocol (Riktlinjer för lokalt samråd 2000). As shown in Figure 4, the protocols from the local forums should be handed into the WMB (NFS 2002:19 §29).
Ownership Structure:

There are about 22.7 million hectares of forestland in Sweden (about 5.8 million hectares of land with impediments). The state owns 18%, private stock companies 24%, individual private owners 51%, other private owners 6%, and other public owners 1% (www.svo.se/minskog/templates/Page.asp?id=16226). In order to hunt, one must either own property or lease hunting rights from the state, forest companies, or private landowners. The most common scenarios by which individuals gain the right to hunt are when families own hunting grounds and hunt on their own land (55%) or when a hunter leases hunting rights, either on their own or together with others (49%) (Prop. 1999/2000: 73:84–87). Only 1% of all private properties are larger than 400 hectares (Fällman, Ligné et al., 2005).

License Areas and Moose Management Organizations:

According to the Hunting Law, all moose hunting requires licensing and should be performed on properties that have been registered at a CAB (SFS 1987:259 §33). The CABs decide what areas can be registered as license areas. There are currently five types of license areas. A-license areas can be registered under the condition that the area is large enough to shoot one mature moose per year and still ensure the existence of the species. During the last twenty years, landowners have increasingly cooperated, which has called for groups of hunting teams that previously hunted separately joining together and receiving a common quota (sw. samlicens) from the CAB (Prop. 1991/92: 9; SOU 1990:60).32

There is also B-license areas, which can be registered for a specific number of reasons as enumerated in a EPA directive33, on which the landowner has the option to

32For example, part of or an entire hunting district can receive a quota from the CAB which, in turn, is divided among the different hunting organizations, such as hunting clubs and WMAs. It has also become more common for “multiple year licenses” (sw. flerårslicenc) to be issued, which means that the CAB decides the largest number of moose that can be shot during a three-year period (Prop. 1991/92: 9; SOU 1990:60).

33 The following special reasons should be taken into consideration for registering B-license areas: 1) hunting rights owner has applied to join nearby license areas but has been denied; 2) nearby license areas approve of registering; 3) there are several hunters within a smaller area who cannot be provided a seat in a new hunting community; 4) older hunting rights owner who have previously not participated in a hunting community; and 5) practical opportunities are missing to get land...
shoot either a mature moose or a calf. However, unlike A-licenses, on which hunting rights owners can hunt during the entire hunting season, the hunting period for B-licenses is a maximum five days—shorter if decided as such by the CAB.

_E-license_ areas can be registered if the area is of at least 20 hectares and one calf can be shot; the hunting period is 70 days. _K-license_ signifies that the area has not been registered at the CAB, but the hunting of calves is allowed for five days, or less, as decided by the CAB (SOU 2007: 63).

Today, there are approximately 9,000 A-license areas with a total area of about 24 million hectares. There are approximately 12,700 B-license areas with a total area of about 827,000 hectares. There are approximately 600 E-licenses with a total area of about 600,000 hectares. There are approximately 700 MMUs with a total area of 12 million hectares (SOU 2007: 63).

There are two main organizations for coordinating moose hunting among landowners in Sweden. One is the WMA, and the other is the MMU. As previously mentioned, landowners also cooperate in other ways, but the WMA and MMU are the only formal organizations that facilitate cooperation between landowners. Two or more properties in the same area can be united to form a WMA in order to coordinate hunting and the management of wild animals (SFS 2000: 592 1 & 3§§). As previously mentioned, the WMA is regulated in a separate law, where conditions for the establishment of the WMA, organization of the WMB board, and right of voting are specified. The WMA association is, for example, entitled to make decisions regarding the organization of hunting, as in whether everyone has to hunt together or not. The association also has the right to make decisions regarding the minimum number of hectares required for each hunting certificate (SFS 2000:592). The members of the WMA can appeal some of the decisions made by the WMB board at the CAB (SFS 2002:592). WMAs constitute approximately 7.3 million hectares (SOU 2007: 63).
However, some WMAs might be large enough to form an MMU; in other instances, a WMA might join with other license areas to establish a MMU.

The most decisive difference is that MMUs can decide how many moose to shoot during a hunting season, while the CAB decides moose allocation for other license areas.

An area of such a size and type of land that it permits, in the main, the management of an entire moose population can by the CAB be registered as a moose management area. Within an MMU hunting is conducted without licensing. An MMU has to have a management plan (1987: 905 §3, author’s translation).

The EPA enacts directives regarding the registering of MMUs (1987: 905 §17). The application to register an MMU shall be handed in by the hunting rights owners to the CAB (NFS 2002: 19 §2). The MMU is an entirely voluntary organization, in contrast to WMAs, which might subject landowners to enforced enrollment. The CAB are also recommended to inform landowners considering joining a MMU that it is entirely voluntary (EPA 2002: 19). Conversely, MMUs are very loosely regulated; the only formal sanction mechanism available for the CABs is to deregister the MMU (see Figure 4) (NFS 2002:19).

The moose administrative system has undergone substantial changes in order to respond to increasing grazing damages and an extensive bureaucracy. In the prior system, there were no local forums in which the landowner interests and hunting interests were negotiated regarding moose allocations to A-license areas and hunting periods for B-licenses. Instead, the SAHWM County Hunting Associations (CHA) did the actual reconsideration of moose allocations and came up with suggestions of quotas for the CABs; therefore, it did not imply considerable administrative work for the CAB (SOU 1990: 60:60). The EPA highlighted the lack of competence regarding wildlife biology, hunting, and preventative damage control among those active in the CHA, stating this needed to be remedied\(^4\) (Prop. 1991/92: 9:152). The WMBs are also supposed to follow the suggestions emanating from the local forums regarding

\(^4\)SAHWM stated that the education of CHA representatives would be one of the most important goals of the organization in the 1990s (Prop. 1991/92: 9:152).
moose allocations and hunting periods (NFS 2002:19 §29 point 7). As can be seen in Figure 4, unless the MMUs have contacts with the local forums, there are no “formal” vertical linkages in the system.

There are still numerous license areas in place, as described herein; the moose administrative structure was built up around this system. There are very few formal regulations of MMUs other than the requirement to submit a management plan to the CAB (1987: 905 §3). The CABs are recommended to consult the WMB regarding the principles applicable to the registering of MMUs (NFS 2002: 19). It is also recommended that the MMU plans be anchored in the local forums (NFS 2002: 19). However, MMUs decide the numbers of moose they will shoot independently of the main administrative structure. If MMUs choose to, they can act as isolated local resource systems with minimal contact with other governing systems, including the administrative structure. As can be seen in Figure 4, the only horizontal linkage between the CABs and the MMUs is the MMU plan. According to the EPA’s general advice, CABs are recommended to review MMU plans every third year (NFS 2002: 19). The importance of both vertical and horizontal linkages is also related to the percentage of MMUs of the total hunting grounds in the counties. The MMUs’ percentage of the total hunting grounds in the Swedish counties is illustrated in Diagram 1.
As illustrated in Diagram 1, in 13 out of 19 counties in Sweden, MMUs cover 40% or more of the total hunting grounds. By 1996, about 49% of the MMUs had been established. Thus, the MMU has become a popular organizational form in many of

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35There is no information for Kronobergs County since this county did not answer the CAB questionnaire.
36The reason for the low percentage of MMUs for the hunting grounds in Västerbotten and Jämtland counties is because a large percentage of these counties are above the Sami land, where few MMUs have been registered due to double hunting rights and the contested issue of the relative strength of the Sami hunting rights. Another reason is the high number of “samlicens” in Jämtland County (Conversation with Tommy Svensson, EPA, at a wildlife conference in Uppsala 2007–10–24).
37The MMU plan data collection was conducted in 2004; since then, more MMUs have been established. Therefore, this percentage has likely decreased somewhat.
the Swedish counties, and a great deal of the Swedish moose management takes place in local resource systems today.

The Swedish moose administrative system was established in the beginning of the 20th century. The administrative system proved successful in promoting the growth of the moose population; however, this in turn led to new policy problems due to the high costs of maintaining the system and the severe grazing damages the large moose populations caused. The Swedish state altered the moose administrative structure in order to rectify the new policy problems; one of the results of these changes was—among other things—the establishment of local resource management of moose throughout the country. These changes will be analyzed from three distinct perspectives in order to discuss principal structural aspects of the current moose administrative system and will be presented in the next chapter.
Chapter 8

POLICY AND ADMINISTRATIVE CHANGES IN THE SWEDISH MOOSE MANAGEMENT SYSTEM

As discussed in the previous chapter, since the beginning of the 20th century, the Swedish state has implemented various policies that have altered the moose administrative system. This chapter presents an analysis of the policy measures and alterations in the administrative system.

The chapter begins with an analysis of the complexity of achieving collective action among landowners and hunters regarding moose management. The policy measures the Swedish state has implemented since the beginning of the 20th century to deal with this issue are also discussed, followed by an analysis of the characteristics of the two 'ideal types' of public administration in the Swedish moose administrative system. Thereafter, the conversion of the Swedish moose administrative system from a top-down to a bottom-up management system is analyzed. The chapter concludes with an analysis of the alterations that have been made in the type of corporate arrangements that designates the moose administrative system.

Collective action:
As previously argued, the Swedish state did not remain passive to the “tragedy of the commons” that characterized the situation of moose populations in Sweden in the end of the 19th century. The reason for the impoverished wildlife populations was that no institutions were in place to stem hunters from shooting as many moose as possible. One policy measure chosen by the state in 1938 was to implement Wildlife Management Areas (WMA), which allowed for forced collective action among
landowners; however, this was considered by some as an infringement of property rights of small property holders. Thus, the hunting interest organization NHA was established to protect this right of all landowners. As mentioned in Chapter 2, property rights are rules at the constitutional level that restrict the lower level of rules (i.e., collective choice rules and operational rules). Therefore, the lack of clarity as to the content of constitutional rules will have ramifications on lower levels of rules. It creates an even more critical problem if the resource is mobile; resource extraction results in subtractability, and exclusion is difficult to achieve. In order to protect the right to hunt on one’s own land without having to cooperate with other landowners, rules have been instituted allowing hunting even for landowners with smaller properties. This right has been restricted by rules regulating the number of moose that can be shot and the number of hunting days. Today, this ‘safety valve’ is the so-called B-licenses, which allow individuals to hunt without having to cooperate on their own land. However, many formal requirements need to be met in order for a person to be able to register a property as a B-license area (NFS 2002:19). Although the system for moose allocations was to some extent streamlined in the early 1990s, the registering of so-called B-licenses still requires a substantial amount of work, especially considering their small percentage of the total hunting grounds.38

When the EPA suggested ways to decrease the administrative tasks of the CABs relating to moose hunting in the beginning of the 1990s, it pointed out that it would not be politically feasible to abolish B-license areas. The EPA thought it important that cooperation among landowners be based on voluntary grounds as forced cooperation led to general discomfort among hunters and, in turn, increased administrative work; in addition, they did not believe that smaller areas had a negative impact on the size of the moose populations. The EPA stated that hunting had a self-regulating ability because, if hunters deem that the moose allocation is higher than what the moose population can stand, they would not shoot the entire quota (EPA report 1990:11-12). The question of B-license areas is somewhat controversial in the sense that, in essence, it is one form of license hunting that in fact discourages

38There are 12,700 B-licences in the country, but they only cover approximately 827,000 hectares.
cooperative behavior among landowners. Both EPA and SAHWM have highlighted the unfairness of B-licenses as these receive a disproportionately large share of moose allocations compared to A-license areas. This in turn undermines the foundation of the system as hunters and landowners lose incentives to cooperate with each other (EPA report 1990:10 & Prop. 1991/92:9:212).

The institutional past often impedes radical changes in formal institutions and makes it difficult to implement new policies effectively. One interesting viewpoint is that, although it is voluntary to join MMUs, they have proliferated. One important incentive to establish an MMU, unlike a WMA, is the management rights that follow with the registration of a MMU. None of the organizations or CABs that commented on the suggestion to establish MMUs seemed to have been aware of how popular this organizational form would become among hunters and landowners; however, this might be an indicator that landowners today realize to a higher degree the benefits of cooperating or at least the necessity in order to ensure vital moose populations (Prop. 1991/92:9). This might reflect an attitude change that has developed due to experiences of cooperating. However, there might be differences in various parts of the country (i.e., there might be a stronger acceptance and willingness to cooperate in certain areas of Sweden). This question will be further investigated in Chapter 11.

Another aspect is whether the size of MMUs actually matches the ecological scale or if it is a mismatch between the social and ecological scale. Minimum area requirements for the establishment of MMUs have been discussed, but not implemented (Prop.1991/92:9). It is reasonable to assume that voluntary cooperation among landowners and hunters have been achieved on geographical scales smaller than that which permits sustainable resource utilization of moose populations. Some of the interviewees brought up this set of problems when discussing ‘biologically’ appropriate management areas of moose. They claimed that it was important not to lose the local anchorage and that there is a need to feel a fellowship between hunting teams (interview 8 & 12). If hunters and hunting teams do not feel any connection, the attitude that “we don’t care what we shoot in comparison to others” might arise (interview 8). Another problem is that of administration. In a case in which there is an
area of 100,000 hectares, this would entail approximately 130 hunting teams that someone has to coordinate in a county with small hunting teams (interview 8).

The question of achieving collective action while simultaneously protecting private property rights has been solved by the ‘safety valve’ of B-licenses in the Swedish moose management system. However, this kind of measure signifies a certain ‘risk’ of undermining the entire system since it in essence discourages cooperative behavior. In addition, the degree of forced cooperation—i.e., the number of property owners who have to agree to the establishment of WMAs—has changed over time. As discussed in Chapter 2 in the latest law regulating WMA, the degree of forced cooperation decreased due to strengthened property rights in Sweden (Prop. 1999/2000: 73). Although it is necessary from an ecological standpoint of view with cooperation between landowners regarding a mobile resource, such as moose, this is always going to be in conflict with the fact that resource extraction is tied to property rights. This highlights difficulties with implementing adaptive co-management that requires ecosystem management and flexible management strategies as this easily conflicts with securing property rights. In the next section, the institutional arrangements of the moose administration will be discussed using public administrative ideal types.

**Corporate and legal-bureaucratic public administrations:**

The first policies implemented in 1938 were directed at achieving collective action among landowners; this assignment was delegated to the hunting interest organization, SAHWM. The Swedish state chose a corporate arrangement and granted the SAHWM the responsibility for the wild care management in Sweden, and it was the only existing hunting interest organization at the time (SOU 1997: 91:448). Public administration tasks can be assigned to an organization in Sweden according to the Constitution; however, if the tasks constitute the exertion of public authority, it has to be regulated in law (RF Kap.11 6§). One reason for states to grant interest organizations the responsibility of implementing policies is that they are close to groups that the policies affect and have a greater understanding of specific situations;
therefore, they can have a higher flexibility in applying rules (Rothstein, 1992:59). It was considered critical with local management regarding moose since flexibility and fast decision making were considered important (SOU 1997: 91: 425). The fact that, at the time, moose populations were small and there were no conflicting interests facilitated the state’s decision to choose this particular arrangement. One reason for interest organizations to participate in the implementation of policies is that they gain influence over important administrative decisions that will affect members of their organizations (Rothstein, 1992). Due to its position in the administrative structure, SAHWM has been able to exert influence as to decisions on moose allocations and, thus, the size of the moose populations, which is of great importance to its members. Another reason is the monopoly position that arises when the state has granted an interest organization the assignment to represent a particular sector since this means increased power resources that can be utilized to further secure its position against competing interest organizations (Rothstein, 1991). It has been highlighted by institutional theorists that changes in formal rules are a result of bargaining between the state and interest organizations (Knight, 1992; North, 1990). If an interest organization has a monopoly in a particular policy field, it increases its bargaining power and claims as a legitimate representative. Due to the fact that SAHWM has the parliamentary assignment to lead the wild care in Sweden, it has been able to secure greater influence over wildlife policies than the NHA, which was discussed in Chapter 6. The NHA demanded that its organization also be represented in the local forums in order for it to gain greater influence over local moose management decisions (Prop. 1991/92:9). Interest organizations also gain access to information and many times financial resources as the state gives contributions to the organizations (Rothstein, 1991). SAHWM has been financed to a great extent by the state since 1938, which—for example—enabled SAHWM to employ hunting consultants throughout the country. In addition, the organization has always received a general fund and therefore had great freedom in how to spend the state funds (Prop.

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39 The SJF professional organization and its hunting consultants had significant influence over decisions related to moose allocations at the regional level as the assigned experts to the WMB and CAB.
However, as previously discussed, a drawback for such an organization is that its members can perceive that the organization has become a tool of the state (Rothstein, 2003). This undermines the corporate arrangements as the legitimacy ground is that interest organizations are supposed to pursue the interests of their members.

However, the CABs have also been responsible at all times for the administration of moose questions. This indicates that characteristics from two types of administrative ideal systems—i.e., corporate and legal-bureaucratic—are present in the moose administrative system. There are many characteristics of the legal-bureaucratic model present in the Swedish moose administrative system. As mentioned in Chapter 4, one characteristic of the legal-bureaucratic model is the presence of general and precise rules. Many rules are precise in their formulation, such as the minimum size of properties required in order to be registered as a certain license area. The CABs could make decisions regarding the number of moose individual landowners could shoot or how many hunting days there were for general hunting areas and so on. Another characteristic of the legal-bureaucratic model is the fact that the CABs are constrained by administrative laws mandating certain working procedures (Wennergren, 2000). Many decisions made by the public administration can also be appealed. The CAB makes decisions on the establishment of WMAs and MMUs; it is also the first instance of appeals regarding disagreements of members regarding decisions made by the WMA boards. The EPA, for example received approximately 600 appeals relating to the allocation of moose quotas, which indicates that this was frequently used by landowners and hunters and considered important (EPA report 1990). The formal decisions on questions such as registering properties as hunting grounds and quota allocations for license areas were made by the CABs; however, SAHWM had considerable influence if not the real decision-making power due to the fact that it was involved in the preparatory work preceding the quota allocations (SOU 1990: 60). One positive consequence of general and precise rules is that the consequences are foreseeable; however, a negative consequence is that the system is inflexible (Rothstein, 1991). Inflexibility when making decisions is especially problematic when
the policy area is dynamic—i.e., the cases are different and change over time (Rothstein, 1991). As discussed in Chapter 3, this is particularly true for the management of ecosystems. The complexity of ecosystems necessitates a great deal of flexibility on the part of management in order to respond to specific situations at diverse times. This will be further considered in Chapter 9.

Ultimately, the success of the system turned out to cause new problems. The high costs of maintaining this detailed top-down management system was no longer considered viable by the state. The forest sector reacted to the increasing amount of grazing damages caused by the large moose populations. Therefore, several policy changes were initiated by the state, as can be seen in Figure 5.

![Figure 5. Policy changes in the Swedish Moose Administration during the 20th Century.](image)

Figure 5. Policy changes in the Swedish Moose Administration during the 20th Century.

The state altered the rules of the game to include the forest sector in the regional moose administration. The results of the altered rules (i.e., the appointment of forest sector representatives on the WMBs, establishment of local forums, abolishment of the grazing damage reimbursement system, and the possibility for landowners to establish MMUs) strengthened the forest sector’s influence over decisions relating to moose management.

So what changes did the Swedish public management system experienced during the last decades? As can be seen in Figure 6, there were basically no wildlife management systems in place at the end of the 19th century. In 1938, the Swedish state chose a corporate arrangement in which one interest organization was granted a semi-
official position. A top-down management system with detailed resource regulation was established.

<table>
<thead>
<tr>
<th>No administrative</th>
<th>Top-down Corporate</th>
<th>Bottom-up Corporate</th>
<th>20th Century</th>
</tr>
</thead>
<tbody>
<tr>
<td>End of the 19th Century</td>
<td>1938</td>
<td>1970</td>
<td>1992</td>
</tr>
</tbody>
</table>

**Figure 6. Changes in the Swedish Moose Administration during the 20th Century.**

As illustrated in Figure 6, in the early 1990s, the moose administrative system was altered in two ways. One alteration was the transformation of a typical top-down conventional resource system to a bottom-up management system. However, it was the local resource users who took advantage of the changes in the formal rules; thus, it can be described as a transformation from the local level. The other major alteration was a change in the type of corporate arrangements that designated the moose administrative system. The SAHWM had been the only interest organization involved in the moose administrative system; however, the change to a corporate arrangement signified the establishment of arenas in which two conflicting interests—i.e., landowner interest organizations and hunting interest organizations—could bargain over decisions. In the next section, the conversion of the moose administrative system from a top-down to a bottom-up management system will be discussed.

**Top-down to bottom-up:**

In the late 1980s, the Swedish moose administrative system was a typical top-down management system. The primary goal of the management system was to achieve maximum sustainable yields (MSY) of moose, which could be specified as single-species management even though at this time alterations were made to include the other resource of economic value (i.e., lumber). Hunting grounds were registered
according to detailed regulations, and moose quota allocations were decided at the regional level by the public administration and SAHWM. However, whether decisions of moose quota allocations were based on scientific knowledge can be questioned since there was a lack of adequate inventory methods and perhaps also knowledge regarding how to utilize these statistics correctly. Instead of biologists calculating moose quotas, the SAHWM County Hunting Associations (CHA) carried out this function; however, it has been pointed out that the members of CHA lacked adequate knowledge of wildlife biology (Prop. 1991/92:9: 152). It has also been suggested that the system was perhaps based to the greatest extent on social allocations rather than biological grounds (EPA report 1990 & SOU 2007:63). These decisions were implemented by the CABs, which can be defined as a legal-bureaucratic public administration.

The decision to open up the possibility for landowners to establish MMUs denoted that the formal rules for a bottom-up management system were in place. As discussed in the property rights section, the establishment of MMUs meant that landowners and hunting rights owners obtained management rights that have a decisive effect on resource users’ incentives to invest in resource management (Ostrom & Schlager, 1996). By applying to the CABs, hunting rights owners can establish self-governing local resource systems whereby they can decide harvesting strategies of moose independently. In addition, few formal rules regulate MMUs other than they have to submit the MMU plan at the time of the establishment (SFS 1987:905 §3). This change is dramatic since the prior system was a top-down management system with minutiae regulations regarding the registering of hunting grounds and allocation of resource quotas. It is safe to conclude that the possibilities for gaining management rights over moose has been judged important by many landowners in Sweden; the fact that it is now such a common feature in the moose management system raises many interesting issues.

One issue is the fact that, despite this drastic change of the system, which denotes that a great amount of moose management decisions are made “outside” the administrative structure, the regional administration has changed routines and practices
in order to ensure sustainable resource utilization. It is reasonable to assume that the 
CABs have adjusted their management procedures in order to ensure that the MMUs 
do not become an isolated local resource system as the management’s right to decide 
harvesting strategies will significantly affect the moose population. According to the 
adaptive co-management approach, a number of strategies could be employed by the 
staff at the regional moose management administration in order to ensure sustainable 
resource utilization. No suggestions as to how the administrative structure might have 
to be reorganized in order to steer a new system were ever mentioned in the bill or 
preceding investigations dealing with this issue (Prop. 1991/92:9 & SOU 1990:60 & 
EPA report 1990). The next section will analyze the alteration in the corporate 
arrangements.

**Alterations in the corporate arrangements:**

Prior to the explosion of the moose populations that occurred in the mid-1980s, the 
fact that an interest organization had been granted the official assignment to lead wild 
care in Sweden was non-controversial and probably a fairly cost-efficient method for 
the state to attain viable wildlife populations. However, the fact that an interest 
organization had such a strong influence called for measures to include the other 
interests (i.e., the landowner side) in the hunting administration in order to decrease 
the potential for conflicts. It is also likely that the state at the time did not have a 
particular ambition to steer the development of moose populations, but only wanted 
to reduce conflicts between hunters and landowners. Therefore, policy measures were 
directed toward including landowner interests to a higher degree in the regional 
moose administrative system by ensuring representation in arenas such as the WMB 
and local forums.

The possibility for the forest sector to have representatives on the WMB has 
meant that they can have an overview of wildlife management in the county and an 
opportunity to influence principal decisions. However, it has also been highlighted 
that at times these representatives were hunters themselves and therefore did not 
adequately represent the forest sector interests. The decision to allow representatives
from the forest sector has also meant that landowner interests have more votes than the hunting interest organizations on the WMB board. This change in the formal rule has not been insignificant; however, this issue will be further discussed in Chapter 10.

In the bill proposing the establishment of MMUs, it was stated that although local forums were established in several counties these should not be made mandatory in order to avoid time-consuming and costly administration (Prop.1991/92:9). Although the local forums were not mandatory, these are now established throughout the country and have denoted a greater influence for the forest sector (Lundvik, 2007). As described in preceding sections, prior to the establishment of local forums, it was the SAHWM hunting consultants and CHA that made suggestions on quotas in each hunting district. In other words, the only chance for other interests to comment on quota allocations was on the WMB, and it was not until 1987 that the forest sector could appoint a representative to the board (Prop. 1986/87:58:65). The local forum and the WMB are both forums in which opposing interests meet in order to reach agreements regarding—among other things—the size of the moose population. The decision procedure involves negotiation in the corporate model and not rule interpretation as in the legal-bureaucratic model (Rothstein, 1991). This decision procedure forces interest organizations that have conflicting interests to confront each other and reach agreements.

However, the fact that the NHA came to have representatives in the local forums also entailed a shift in SAHWM’s monopoly situation in the regional moose administration. SAHWM was no longer the only hunting interest organization that directly participated in the regional moose administration.

The state remained a relatively passive actor. Agreements as to the organization of the local forums have been made by the hunting interest organizations and land interest organizations without the interference of the state. In addition, the argument for appointing politicians as chairmen on the WMBs aimed to ensure that no special interest held the positions as there were bound to be conflicts on the board (Prop. 1999/2000:73:82). The state chose the role of mediator between the two major interests.
The corporate arrangement focuses primarily on two interests in society, thereby excluding, for example, nature interest organizations to a great extent. Bodies such as nature interest organizations and universities have repeatedly highlighted the importance of biological competence and representation of nature interests; however, the administrative structure has not altered in such a way as to provide these with a substantial influence (these do not participate in the local forums and are not equally represented in the WMB). SAHWM has even stated the opinion that only representatives from the forest and agricultural sector and hunting interests should be represented on the WMB, with other interests only called in (Prop. 1991/92: 9:78). This can be problematic, especially as the state takes a relatively passive role (i.e., to ensure the public interests are addressed if they differ from those of the landowner interests or hunting interests). Will either of these two interests ensure biological diversity or would this societal value be pursued more efficiently by nature interest organizations?

Have the changes in the formal rules had the desired effect? If interest organizations in corporate arrangements do not meet substantial opponents, they tend to radicalize their viewpoints; therefore, it is necessary with equal bargaining partners if special interest is not going to overweigh the public interest (Öberg, 1994). Prior to the policy changes in the early 1990s, SAHWM did not encounter substantial opponents, but could pursue its own policies. This begs the question of whether today SAHWM does as a result of the alterations in the regional moose administration. However, as previously discussed, even if formal rules are altered, it does not automatically mean that these will have a real effect. Changing rules is about changing people’s expectations (Knight, 1992). New formal rules might be contradictory to norms and therefore not followed by people. For example, forest sector representatives on the WMB did at times not adequately pursue the forest sector interests due to the fact they that they were hunters. Therefore, organizations have to ensure that their members are aware of the new rules of the game and also instruct them on how to play the game. The intention behind the establishment of MMUs was to provide landowners with a tool so they could control the size of the moose populations.
Therefore, it is relevant to find out whether MMUs have truly become a tool of the landowner—that is, did the change in the formal rule have the desired effect? This question will be discussed further in Chapter 11.

To summarize, how to solve the problem of collective action has been a constant policy problem, and the main way for dealing with this issue has been to encourage cooperative behavior in numerous ways. However, the state also implemented rules permitting a certain degree of forced collective action in 1938. However, due to a lack of legitimacy among many landowners of forced collective action, there has always been 'scope' for landowners to hunt on their own without having to cooperate, although they were restricted by harvesting rules. Perhaps this now quite long tradition of cooperation among landowners and hunters has led to a change in norms—namely, a higher acceptance of the necessity to cooperate regarding moose hunting than in 1938. This norm of cooperation among landowners and hunters might have facilitated the establishment of MMUs throughout the country.

Since the moose administrative structure was established, the Swedish state has opted for corporate arrangements although the specific characteristics have changed from only SAHWM’s involvement to include landowner interests and NHA to a higher degree. The change in corporate arrangements as well as the alteration from a top-down management system to a bottom-up system has been quite essential. Due to the fact that MMUs now extend over such a large part of the total hunting grounds, it is relevant to determine whether adjustments have been made in the moose administrative system to adapt to this change. As previously discussed, the role of the public administration differs in conventional top-down resource management system versus adaptive co-management. This will be further discussed in Chapters 10, 11, and 12?

The prerequisites for the development of adaptive local moose management systems were in place; thus, the question now is to what extent MMUs can be characterized as adaptive co-management systems? This question will be answered in the next chapter.
Chapter 9

**TO WHAT EXTENT ARE MMUS ADAPTIVE CO-MANAGEMENT SYSTEMS?**

In this chapter, it will be clarified to what extent MMUs can be regarded as adaptive co-management systems. The empirical evidence consists of a quantitative analysis based on data in the MMU database. However, some features of the adaptive co-management approach, such as local ecological knowledge (LEK), learning, and monitoring, are based on the results from the CAB questionnaire, and the interviews conducted with regional actors in the moose administrative system.

Subsequently, how these points can be addressed by the variables in the database will be explained. Five separate criteria will be utilized to evaluate whether MMUs can be considered adaptive co-management systems: 1) management success; 2) ecosystem management; 3) monitoring; 4) management measures; and 5) learning. In addition, *local ecological knowledge, monitoring, and learning* will be discussed. These measurements have been developed from concepts derived from the adaptive co-management literature. Finally, whether there are regional differences regarding the level of adaptive co-management systems will be investigated.

**9.1 MANAGEMENT SUCCESS**

As discussed in Chapter 3, adaptive co-management promotes sustainable resource utilization. Therefore, it is important that resource users can reach their natural resource management goals. Whether collaborative efforts have led to set up goals and objectives is the most common form of evaluation (Conley & Moote, 2003). Thus, it will be investigated if they have been able to calculate the correct moose shooting off
required in order to reach their stated goal of the size of the moose population. In other words, this is a measure of whether they are actually able to calculate correct moose shooting off, which requires some basic knowledge in population dynamics. However, two other management goals are of a subjective nature in the sense that landowners and hunters should perceive themselves to be successful in reaching their management goals. One often-set goal is that the moose population contains enough bulls. As it is very popular to shoot mature bulls and their habitats are large, this is not always an easy goal to reach. Bull population estimates will provide an answer regarding the extent to which MMUs have been successful in achieving their preferred moose population composition. Another perspective is whether they consider the amount of grazing damages to be acceptable and not too large. If they consider these to be significant, they have not reached their own management goal.

The first criterion, called *management success*, thus contains three variables: the ability to calculate correct moose shooting off in order to reach the desired size of the moose population; the percentage of bulls in the moose population; and the amount of grazing damage. First, each separate variable will be introduced and discussed.

Table 5 depicts the ability of the landowners and hunters to calculate the correct number of moose shooting off necessary in order to reach their goal.

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4Göran Bergqvist, ungulate specialist at SAHWM, has provided a formula for calculating whether MMUs are able to calculate correct moose shooting off. The reproduction of the moose population was calculated, and the planned shooting off deducted. This resulted in a number of moose per 1,000 hectares. This number was compared to the stated goal of moose per 1,000 hectares. If these two figures were differentiated by less than +/-1.5 moose, it was determined that they had calculated the correct shooting off; if these differentiated more, it was determined that they had not calculated the correct shooting off.
Table 5. Calculation of moose shooting off in MMU plans.

<table>
<thead>
<tr>
<th>Calculations</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct calculation of number of moose to shoot in order to reach the desired size of the moose population</td>
<td>61%</td>
</tr>
<tr>
<td>Incorrect calculation of number of moose to shoot in order to reach the desired size of the moose population</td>
<td>39%</td>
</tr>
</tbody>
</table>

N=476

Of all the investigated MMU plans, 476 have sufficient information to be able to examine whether these contain correct calculations of moose shooting off. In some MMU plans, there are no figures on a goal as to the size of the moose population or moose per 1,000 hectares. In about 39% of the MMU plans, the landowners and hunters have not been able to calculate the right number of moose to be shot in order to reach the size of the moose population that they desired. This lack of basic estimates of population dynamics and inability to calculate correct shooting off has been commented on by respondents to the CAB questionnaire. For further discussions on this topic, see Chapters 10 and 11.

Forest companies are no better at calculating moose shooting off; approximately 58% are unsuccessful compared to 62% of the privately owned MMUs. In the adaptive co-management literature, so called key stewards are mentioned as critical for the development of adaptive co-management systems (Olsson, Folke et al., 2004). Many of the interviewees pointed out that the success of MMUs was entirely dependent on the active persons in the management of MMUs, particularly the chairman. Some of the interviewees stated that forest companies’ employees were no better at managing MMUs, but it is entirely dependent on the responsible person’s interest and ability to communicate with hunting team leaders (interview 14, 9, and 19).

41The ownership structure of the MMUs was collected by the SAHWM hunting consultants. The MMUs were divided into three categories: privately owned, company owned, or a mixture.
Table 6 presents the proportion of bulls in the moose population. To ensure the reliability of numbers, it is critical that MMUs have utilized reliable monitoring methods.42

### Table 6. Percentage of bulls in moose populations.

<table>
<thead>
<tr>
<th>Monitoring Method</th>
<th>Bulls in the moose population</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>All MMUs</td>
<td>MMUs with too few bulls in the population</td>
<td>86%</td>
</tr>
<tr>
<td></td>
<td>MMUs with acceptable percentage of bulls in the population</td>
<td>14%</td>
</tr>
<tr>
<td>N = 404</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MMUs that have utilized both airplane inventory and ÄlgObs</td>
<td>MMUs with too few bulls in the population</td>
<td>83%</td>
</tr>
<tr>
<td></td>
<td>MMUs with acceptable percentage of bulls in the population</td>
<td>17%</td>
</tr>
<tr>
<td>N = 100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MMUs that have utilized either airplane inventory or ÄlgObs</td>
<td>MMUs with too few bulls in the population</td>
<td>86%</td>
</tr>
<tr>
<td></td>
<td>MMUs with acceptable percentage of bulls in the population</td>
<td>14%</td>
</tr>
<tr>
<td>N = 313</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6 shows that 86% of MMUs have moose populations with less than 30% of bulls according to the numbers in the MMU plans. This result seems to indicate that it is difficult for MMUs to actually reach their aims. In many of the MMU management plans, one goal relative to moose populations is to increase the percentage of bulls. Research has shown that low percentages of bulls in a moose population lead to lower weights of the animals and fewer calf births (Wilsson, 2004). It has been recommended that a goal for moose management systems should be that the population does not contain less than 40% of bulls43 (Wilsson, 2004). One explanation

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42The wildlife biologist, Göran Ericsson, claims that for the information on the number of moose per 1,000 hectares to have any reliability, MMUs should have utilized both ÄlgObs and airplane inventory (Umeå 15-09-05).
43This was recommended in an article published by SAHWM in its magazine *Swedish Hunting* (sw. *Svensk Jakt*). However, this is debated among researchers, and some claim the percentages of bulls
for the low levels of bulls is that the harvesting strategies implemented in the 1970s and 1980s that recommended hunters not shoot reproductive cows are still being applied (Wilsson, 2004). However, another probable explanation is that, in MMUs of approximately 60,000 hectares, 30% of the bulls will be shared with neighboring areas (Ericsson & Wallin, 1995). Only 28 MMUs are larger than 60,000 hectares (MMU database); therefore, the majority of MMUs share bulls to a great extent. The median-sized MMU is about 10,000 hectares (MMU database), which means that the median-sized MMUs share about 40–60% of the bulls with their neighbors, depending upon where in the country the MMUs are situated (Ericsson & Wallin, 1995). Irrespective of monitoring methods used, there is no decisive difference in the figures; therefore, the likelihood that these are accurate is fairly high. Although the reliability of the numbers is not as high as would be wished for, the figures indicate that it is probably a problem for many MMUs. Low percentages of bulls in moose populations are perceived as a problem on the national level by many as well (Wilsson, 2004).

The third variable that is part of the management success is the amount of grazing damage. In the MMU management plans, resource managers could note whether they considered the grazing damage to be “insignificant,” “acceptable,” or “significant.”

Table 7. The amount of grazing damage in MMUs.

| MMUs with significant grazing damages | 28% |
| MMUs with insignificant or acceptable grazing damages | 72% |

N = 546

.. can be quite lower without any risk for the genetic regeneration of moose populations (Trial licentiate thesis seminar with Göran Ericsson 05-10-18).

“In an MMU of 60,000 hectares, it was found that about 30% of the bulls will be shared with neighbors under the presumption that the moose “habitat” is, on average, 1,500 hectares. The habitat of moose varies from 500 hectares to 3,000 hectares, depending on the sex of the animal (bulls have habitats twice the size of cows) and what part of the country it is. In northern Sweden, moose also migrate between summer and winter feeding grounds (Ericsson & Wallin, 1995).
Table 7 indicates that a majority of the MMUs consider the amount of grazing damage to be insignificant or acceptable, yet 28% of MMUs are of the opinion that grazing damage is significant. This is a problematic result considering the negative effect grazing has on both the value of the forest and on biological diversity. However, there is a difference depending on the ownership structure of MMUs.

Approximately 51% of the forest company-owned MMUs consider the grazing damages to be small or acceptable while the corresponding number for privately owned MMUs is about 77%. It is likely that forest companies have a lower tolerance for grazing damages than private landowners; however, they are still less successful in reaching their management goal as to the amount of grazing damages.

The overall management success and the flexibility of local resource systems:

To estimate the general management success of MMUs, the three variables have been added—i.e., calculation of moose shooting off, the percentage of bulls in the moose population, and the perceived amount of grazing damage. If correct shooting off has been calculated, the value assigned is 1. If incorrect shooting off has been calculated, the score assigned is 0. If the percentage of bulls in the moose population is within the range of 31-70%, it was given the score 1. If the percentage of bulls in the moose population is outside the range of 31-70%, it is given the score 0. If the estimated grazing damage is considered as small or acceptable, the value 1 has been assigned. If the estimated grazing damage is large, the score 0 has been assigned. Hence, if a MMU has a score of three, it has managed to calculate how many moose it should shoot in order to reach its goal as to the size of the moose, the bull percentage of the moose population is within the range of 31-70%, and it considers grazing damages as acceptable or insignificant.

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45 Total number of cases is 523.
Table 8. Management success.

<table>
<thead>
<tr>
<th>Management Success</th>
<th>Score</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>High management success</td>
<td>Score=3</td>
<td>6%</td>
</tr>
<tr>
<td>Some management success</td>
<td>Score=2</td>
<td>47%</td>
</tr>
<tr>
<td>Low management success</td>
<td>Score=1</td>
<td>34%</td>
</tr>
<tr>
<td>No management success</td>
<td>Score=0</td>
<td>13%</td>
</tr>
</tbody>
</table>

N = 360

Table 8 indicates that 53% of the MMUs have some or a high management success in reaching their goals, while 47% of the MMUs had no or low management success.

Overall, these figures indicate that about half of Sweden’s MMUs have difficulties reaching their management goals. The fact that there are so many MMUs that cannot calculate shooting off and that the percentages of bulls is fairly low can have disastrous consequences in the long run for the vitality of the moose populations since a third of the moose population is decimated via hunting every year. However, there are also advantages of local resource systems.

One of the advantages of local resources systems to that of centralized top-down conventional resource management systems highlighted in the adaptive co-management literature is that local resource users are faster at detecting changes in ecosystems and can also respond with higher flexibility (Davidson-Hunt & Berkes, 2003; Olsson & Folke, 2001). As have been discussed, the regional moose management system has quite a complex procedure for allocating moose to various license areas and still takes place once a year, prior to the hunting start. In addition, it has been asserted that the system was based on achieving social fairness rather than to achieve biologically suitable allocations (EPA report 1990 & SOU 2007: 63). A formal system in which centrally decided quota allocation decisions are made once a year hampers possibilities to adjust shooting numbers during the hunting period. For example, some license areas might not have shot their entire quota while other license areas fill their quotas quickly and there is no mechanism for redirecting the total moose quota.
Two important benefits of MMUs have been pointed out by the interviewees in regards to the system: 1) it facilitates adjustment of moose shooting off during the hunting period and 2) it allows for differentiated moose allocations according to the productivity of the hunting grounds (interviews 6, 8, 9, 12, 15, and 17). For example, some MMUs meet 2-3 times per year, which means that they meet once prior to the hunting start and thereafter approximately two weeks after the start of the hunting period. This allows them to discuss the situation and adjust harvesting strategies if necessary (interview 6). This kind of flexibility would be very difficult to achieve in a centralized system as information has to be conveyed from local appropriators to the central level and vice versa. One interviewee highlighted the fact that MMUs are a much smoother system as it also allows for adjustments of shooting off numbers of moose on a yearly basis (interview 9).

Another important aspect regarding moose is that some hunting grounds have a much higher productivity as the vegetation in some places is preferred by moose and other locations might be constituted by, for example, farmland. The fact that moose allocations to license areas are primarily based only on the size of the hunting grounds signifies that no consideration is made as to the land’s productivity. In some MMUs, they have managed to establish rules that consider the productivity of separate parts of the MMU (e.g., hunting teams on land of low productivity are allocated fewer moose than hunting teams on the more productive land within the MMU) (interviews 9 and 12). However, other MMUs have not been able to establish rules allowing for this to take place due to jealousy according to some interviewees (interviews 8 and 15). This might be easier for a forest company to accomplish as they control the entire area and have the formal right to decide moose allocations within a MMU and can perhaps also relocate hunting teams in order to ensure ‘fairness.’ For example, one forest company forest manager stated that they applied differentiated moose quota allocations and thereby considered the fact that some areas contained more moose. He also claimed that moose quota allocations used to be of a social character (i.e., after the number of people in the various hunting teams), but since the possibility arose to establish MMUs, they have changed the basis for moose allocations (interview 1).
9.2 Ecosystem Management

As previously discussed, one major difference between adaptive co-management and conventional resource management is that in the former system single-species management is replaced by ecosystem management.

Landowners and hunters are jointly responsible for ecosystem management regarding wildlife in Sweden. However, the paragraphs pertaining to ecosystem management in the Hunting Law are formulated with a focus on the size of wildlife populations relative to public and private interests; there is no mention of ecosystem management per se (SFS 1987:259 §4). However, the responsibility for ensuring biodiversity is regulated in the Forest Act, which states that the forest is a national asset that must be taken care of in a sustainable manner in order to ensure its productivity while simultaneously protecting biological diversity (SFS 1979:429 §1). The National Board of Forestry (NBF, sw Skogsvårdsstyrelsen) and the Forestry Agencies (FA, sw Skogsstyrelserna) are required to ensure that biological diversity is preserved and the forest is protected against animals (SFS 1993:1272 §3 p. 2, 5). The goal of maintenance of biological diversity is of equal importance to that of the production. Still, many of the civil servants at the FA have not even heard of ecosystem management. However, sustainable forestry is a concept utilized in the FA, and it stems from principles for sustainable forestry approved at the UN environmental and development conference in Rio in 1992 (Skogsvårdsstyrelsen rapport nr.17/2006). At the establishment of MMUs, no regulations regarding the importance of considering biodiversity or ecosystem management were enforced.

46“The wildlife should be cared for in order to preserve wildlife species that constitute the country’s wildlife populations […] and further an appropriate development of wildlife populations with consideration to public and private interests. Wildlife care, through special measures, ensures that wildlife is protected, and that the hunting pressure is adjusted according to the status of populations. Landowners and persons leasing hunting rights are responsible for taking appropriate measures and for making adjustments” (SFS 1987:259 §4, author’s translation).

47NBF and the FA were merged into one state agency in 2006, named the Forest Agency (sw. Skogsstyrelsen).

48There are still disagreements on international level regarding the content in the concepts of ecosystem management and sustainable forestry; however, the main difference is that the ecosystem concept entails a more holistic view while sustainable forestry is more focused on lumber production (Skogsvårdsstyrelsen rapport nr.17/2006).
In order to estimate the degree of ecosystem management applied by MMUs, an ecosystem index composed of three variables was created: utilization of a local grazing damage inventory method; wildlife care efforts; and estimation of grazing damage on various tree species. First, each of the variables will be presented. Table 9 notes the percentage of MMUs that utilize a local grazing inventory method.

Table 9. MMUs use of local grazing damage inventory.

| MMUs using a local grazing damage inventory method | 23% |
| MMUs not using a local grazing inventory method   | 77% |
| N = 618                                           |

One efficient way to both ensure biological diversity and control the extent of grazing damage on various tree species is for local resource users to employ a local grazing damage inventory method. National surveys by the Forest Agency (FA), called Åbin, are conducted on the amount of grazing damage (see Appendix 5 for further information). However, these surveys only cover larger geographical areas and are not detailed enough to use on the relatively small-scaled MMUs. Biologists have developed several versions of local grazing damage inventory methods; the latest version is called Local Åbin. Detailed instructions on how to use this method are available on the FA website. The scientist who developed the method says it is easy to use49. However, in the pilot study, an interviewed chairman of a MMU comprised of three WMAs claimed that he had tried to use the index, but found it difficult (interview 2). This might be an indication of difficulties in transferring scientific inventory methods to local resource users. This issue will be further discussed in the monitoring section.

The second variable that is conceived to reflect ecosystem management is wildlife care efforts. Table 10 presents wildlife care efforts performed by MMUs.

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49Conversation with wildlife biologist, Roger Bergström, Umeå, 15-09-05.
Table 10. Wildlife care efforts performed by MMUs.

<table>
<thead>
<tr>
<th>Wildlife care efforts</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearing of forest</td>
<td>16%</td>
</tr>
<tr>
<td>Wildlife feeding</td>
<td>7%</td>
</tr>
<tr>
<td>Other wildlife care efforts</td>
<td>16%</td>
</tr>
</tbody>
</table>

N = 557

Table 10 demonstrates that it is not very common for MMUs to perform wildlife care efforts. However, Swedish hunters may still believe that they perform adequate wildlife care efforts. A survey of Swedish hunters’ attitudes toward performing wildlife care efforts conducted in 1997 disclosed that 73% believe that their wildlife care efforts are meaningful. Approximately 15% of the hunters did not perform any because of long distances to the hunting grounds, and approximately 10% of the hunters did not conduct any because they were dissatisfied with the short hunting leases granted for their hunting grounds (SOU 1997: 91:237).

A third variable that is believed to reflect ecosystem management is whether grazing damage on more than just economically valuable tree species is noted in MMU management plans. Estimates of grazing damage on more than three tree species would indicate that ecosystem management is considered. If resource users utilize a local grazing damage inventory method and identify damage on various tree species, this represents a holistic view of the ecosystems and perhaps also represents efforts taken to maintain biodiversity.
Table 11. Estimates of grazing damage on various tree species.

<table>
<thead>
<tr>
<th>Notes on grazing damages</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No notes on grazing damages in MMU plans</td>
<td>31%</td>
</tr>
<tr>
<td>Notes on grazing damages on one to two tree species in MMU plans</td>
<td>37%</td>
</tr>
<tr>
<td>Notes on grazing damages on three or more tree species in MMU plans</td>
<td>32%</td>
</tr>
</tbody>
</table>

N = 637

Table 11 shows that 32% of the MMUs actually report grazing damage on more than three tree species. Conversely, 31% made no notes at all regarding grazing damage on specific tree species. However, this result might, in part, be explained by the different MMU templates established by the SAHWM; not all MMU management plan versions have specific places for writing down grazing damage on more than pine and birch. In Table 12, the three variables have been summarized to indicate the overall degree of ecosystem management utilized in Swedish MMUs. The scoring range is 0-5 because MMU members can perform more than one wildlife care effort. If they use a local grazing inventory method, the value assigned is 1; if not, the value 0 is assigned. If there are estimations of grazing damage on three or more separate tree species, the score 1 is assigned; if less, the score 0 is assigned. For each wild care effort that has been undertaken, a value of 1 is assigned. This measurement can give an adaptive score up to five.

Table 12. Degree of Ecosystem Management.

<table>
<thead>
<tr>
<th>Score</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None (score = 0)</td>
<td>51%</td>
</tr>
<tr>
<td>Some (score = 1-2)</td>
<td>42%</td>
</tr>
<tr>
<td>High (score = 3-5)</td>
<td>7%</td>
</tr>
</tbody>
</table>

N = 637
Table 12 indicates that half of the Swedish MMUs do not apply an ecosystem perspective (score 0) on the management of the moose population, while 42% have some kind of ecosystem management and only 7% have a high degree of ecosystem management. Thus, the degree of ecosystem management is fairly low, especially considering how adaptive co-management theories emphasize the importance of local resource users actually considering the entire ecosystem and not only single species.

However, ecosystem management can be applied by distinct levels in a natural resource management system. This section has investigated ecosystem management applied at the local level. Chapter 12 will discuss whether ecosystem management is applied by the moose administrative system at the regional level. The next section will discuss monitoring.

9.3 MONITORING

As previously mentioned, one important feature of adaptive co-management is monitoring. Monitoring of a resource is essential in making management decisions, such as how many moose to shoot (for further details on the various monitoring methods, see Appendix 5). The responsibility for diverse inventory methods are as follows: 1) SAHWM is responsible for ÄlgObs and representing the results in the local forums and 2) hunters report the number of moose they have shot to the CABs, but SAHWM is also responsible for felling statistics and presenting them to the local forums. In addition, CABs do at times finance airplane inventory of hunting grounds in the county via the moose county fund (sw. älgvårdsfond) and at times with the financial assistance of landowners. Landowners and hunters can also conduct their own inventories of moose—for example, by financing airplane inventory or conducting dropping inventory.

The MMU plans contain information as to what inventory methods the local appropriators base their population estimates on. All monitoring methods have strengths and weaknesses, but the reliability increases if one utilizes more than one
method. The utilization of monitoring methods within Swedish MMUs is described in Table 13.

Table 13. Monitoring methods utilized by the MMUs.

<table>
<thead>
<tr>
<th>Method</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>ÄlgObs inventory</td>
<td>54%</td>
</tr>
<tr>
<td>Airplane inventory</td>
<td>26%</td>
</tr>
<tr>
<td>Winter inventory</td>
<td>2%</td>
</tr>
<tr>
<td>Dropping inventory</td>
<td>5%</td>
</tr>
</tbody>
</table>

N = 637

The most commonly utilized monitoring method is ÄlgObs, which is not surprising as this method is coordinated nationally by SAHWM and has existed since 1985 (Ericsson & Wallin, 1998). Älgobs, in which hunters note the number of moose they spot during a week of the hunting period, is connected to the harvesting as are many ‘traditional’ monitoring methods. However, somewhat surprising is that as many as 26% of the MMUs actually have, at some point, utilized airplane inventory, a method that is fairly expensive. As can be seen in Table 14, the winter inventory method and the droppings method are rarely utilized. In Table 14, the number of moose monitoring methods utilized by the MMUs is presented.
Table 14. The amount of moose monitoring methods utilized by MMUs.

<table>
<thead>
<tr>
<th>Monitoring Methods</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero monitoring methods</td>
<td>26%</td>
</tr>
<tr>
<td>One monitoring method</td>
<td>49%</td>
</tr>
<tr>
<td>Two monitoring methods</td>
<td>23%</td>
</tr>
<tr>
<td>Three monitoring methods</td>
<td>2%</td>
</tr>
</tbody>
</table>

N = 543

A relatively large number of MMUs do not utilize any monitoring methods, while some MMU management plans lack adequate information. However, 49% of the MMUs use at least one monitoring method and 23% utilize two monitoring methods.

In an adaptive co-management system, the role of the public administration in regards to monitoring would be to provide scientific monitoring methods as well as ensure that results are spread to local appropriators. The local appropriators, on the other hand, are expected to carry out monitoring and therefore need to possess both knowledge as how to do it as well as be willing to spend the time and effort on it.

Some of the comments by the respondents in the CAB questionnaire pointed to the lack of adequate monitoring not only among MMUs, but also overall. One respondent stated that the lack of inventory statistics made it difficult for them to criticize MMU plans as they did not have adequate information with which to back it up (CAB questionnaire). There has been a lack of systematic treatment of inventory statistics. However, in 2007 SAHWM created a webpage with inventory and shooting off statistics called Wildlife Data (sw. Viltdata), into which hunting teams can report their ÅlgObs and shooting off statistics50 (www.jagareförbundet.se). Hunters appreciate SAHWM’s web pages as they can access feedback on data they have collected and can understand its usage, according to a CAB hunting administrator (interview 11). However, the interviewed forest company employees commented that they had perceived deficiencies regarding the spread and data process of ÅlgObs. One forest company employee made the following statement regarding the information handed

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50Hunting teams’ representatives have been informed of the webpage, and internet access is not a problem.
into the local forums: “It has been difficult to get ÄlgObs for the right area, and so on, and there has been some shortcomings but I don’t where, if it depends on the person that summon the forum or the ones responsible for putting together the material” (interview 9). The other forest company employee stated that there had been improvements in the data treatment in the last two to three years and that he might have had some influence over this (interview 17).

The counties do at times finance airplane inventory. Some of the interviewees expressed disappointment that there was no money to fund airplane monitoring (interview 6). For example, one FA employee stated that they used to have a program in the county where they combined airplane inventories with results from Äbin. However, due to the difficulties in collecting money from private landowners, and since it had not been possible to increase the fell fee, they had to stop (interview 4).

Some forest companies have utilized airplane monitoring, although they also find it quite expensive. One forest manager stated that they seldom used helicopter monitoring due to the high costs; however, they had done so at the establishment of some of the MMUs. They had also contracted Swedish Wildlife Management, a wildlife consulting company, (Svensk viltförvaltning AB) for a three-year project in order to estimate the size of the moose populations (interview 1). Another forest company employee stated that they had conducted their own airplane inventory, counting of spilling, and utilized ÄlgObs. At first, some of the hunters had performed the counting of spilling; however, due to a lack of interest, the forest company had hired entrepreneurs who were educated by Swedish Wildlife Management. He thought this was more efficient as fewer people were involved, thereby improving the results; he considered it a good complement to other monitoring methods and more inexpensive (interview 9).

Local appropriators need to possess some knowledge in order to conduct monitoring correctly; they also have to be willing to spend time on it. A project addressing local moose management, the so-called LÅS project\(^{51}\), disclosed that

\(^{51}\)LÅS was a project run by the research department at SAHWM and started in 1997. It was an experiment on “local moose management” in 10 different areas. The landowners and hunters set goals as to the development of moose populations and were assisted by a hunting consultant. A
hunters had difficulties understanding and using monitoring methods of moose (Wallin, Vikberg et al., 2003). They found that hunters did not have adequate knowledge of how to collect and treat data and believed that one reason for this was the shortage of time hunters had to devote to moose management. The hunters also lacked understanding of basic statistical concepts, such as random sampling; therefore, as an example, they counted droppings outside of marked areas (Wallin, Vikberg et al., 2003). Some of the interviewed regional actors focused attention on the fact that inventory methods had a lot to do with psychology. For example, some people remain skeptical of the value of ÅlgObs and question whether it really is a scientifically proven method (interviews 6 and 11). Hunters are also more prone to believe in the results of airplane inventory, as it is a direct measurement of the number of moose that can be seen (interviews 11 and 17). The forest manager claimed that there should be a small number of people monitoring in order to ensure high reliability and claimed that what they needed was better monitoring methods (interview 1). The LÅS project concluded that hunters exhibited a lack of competence in the biological management of the moose. The LÅS project indicates that the Swedish hunters not only lack understanding of monitoring methods, but they also do not have the time to acquire these skills. However, it also is important to note that the hunting certificate education does not contain any information on monitoring methods or basic statistical concepts underlying these.\(^{52}\)

It has been highlighted that management rights are important for providing incentives for local appropriators to engage in management activities (Ostrom & Schlager, 1996). In Sweden, many hunters do not own their own land, but lease hunting rights from both forest companies and private landowners. The hunters leasing hunting rights might not be willing to spend time monitoring moose populations or do it correctly. According to a forest company district manager\(^{53}\), the hunting team leaders on the forest company grounds had difficulties mobilizing hunters for inventories, which resulted in more or less guesswork regarding the

\(^{52}\)Conversation with Göran Bergqvist (cloven-hoofed animal consultant at SAHWM) 07-10-05.
\(^{53}\)Interview with a district manager at a forest company, 13-02-04.
population status. Another forest company employee had not managed to get the hunters to count dropping. In addition, he had also tried to get the hunters to collect uteri and jaws, but since none wanted to do this, he had contracted a forest school (interview 9). A hunting team leader, hunting on forest company grounds, stated that when they lost their rights to lease land, they felt insecure as to their possibilities to continue hunting; therefore, they lost their initiative to invest time and money in moose management. About ten years ago, the forest company changed land leases into hunting licenses, which—among other things—meant that hunters could no longer invite friends to hunt\textsuperscript{54}. The reason behind this change was that the forest company felt it was easier to terminate hunting leases than land leases. As discussed, hunters were also unwilling to perform wild care efforts due to dissatisfaction with short hunting leases (SOU 1997:91:237).

To summarize, the public administration has an important task in coordinating monitoring methods of moose and grazing damages in the county. One aspect is to ensure that hunters, for example, fill out ÄlgObs; however, it is just as important that the results be conveyed to local appropriators, especially if these have management rights. However, hunters seem to need education in basic statistical concepts in order to be able to conduct monitoring methods correctly. However, the LÅS project disclosed that hunters might not have the time to invest in management activities. It also seems that hunters without management rights cannot be expected to have incentives to conduct time-consuming monitoring of moose or wild care efforts. In the next section, the management measures taken by the local resource users will be examined.

\section*{9.4 MANAGEMENT MEASURES}

Another way to measure the “adaptiveness” of a management system is to combine different criteria. To decide whether the moose management system is adaptive, the presence of the following aspects should be determined: 1) ecosystem management; 2)

\textsuperscript{54}Telephone interview with a hunting team leader on forest company land, 24-03-04.
local ecological knowledge; 3) learning; 4) experiments; 5) monitoring; and 6) responses to environmental feedback. For example, do resource users perform several monitoring methods, or do they have a goal concerning the size of the moose population, etc.? Although this is not an exact indicator of ‘adaptiveness,’ this measure will give an indication of whether the MMUs perform central activities related to adaptive management. For this purpose, yet another index has been constructed. The total number of variables in this management measure index is 20 (for further details, see Appendix 4). Diagram 2 shows the frequencies of management measures among the MMUs. The maximum value is 20.

Diagram 2. Frequencies of management measures in MMUs.

None of the MMUs perform more than sixteen management measures. However, this was not unexpected as it is unreasonable to expect any MMU to utilize all monitoring methods. In 100 of the MMU plans, the local resource users perform eleven
management measures. However, many of the MMU plans lack adequate information; therefore, the number of management measures performed by local resource users in Swedish MMUs probably is somewhat higher. In Diagram 3, the mean management measure index scores in various MMU management plan years are illustrated.

![Diagram 3. Number of management measures in different MMU plan years.](image)

As can be noted, the amount of management measures within the MMUs has increased. There are two possible explanations for the increase in the amount of management measures: 1) CABs might have higher demands on the content on the MMU plans or 2) appropriators might actually have taken more management measures. As mentioned earlier, it takes time to establish adaptive co-management systems as resource users have to conduct experiments and learn about the ecosystem. Presumably, it has taken some time for the MMUs to coordinate their management measures and to apply appropriate management strategies. This will be investigated further in the next section.
As has been argued, learning by the local resource users is an important aspect of adaptive co-management systems. Although only one MMU plan has been collected for each MMU, the database contains information pertaining to which year the MMU was established, making it possible to state how long a specific MMU has existed. Thus, it is possible to state whether actors in MMUs that have existed over a longer time period have also improved their skills and taken more management measures than those active in MMUs that have existed for a shorter time period. In addition, one question in the CAB questionnaire inquired as to the improvement of MMU plans over time.

One way of testing whether the landowners/hunters are learning is if those MMUs that have existed over longer time periods have become better at calculating moose shooting off. This is based on the assumption that they have picked up this skill and can also apply it when writing the MMU plan. In Table 15, the relation between how long MMUs have existed and their ability to calculate correct shooting off is depicted.

<table>
<thead>
<tr>
<th>Calculation</th>
<th>MMUs that have existed from 1 to 6 years</th>
<th>MMUs that have existed 7 or more years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct calculation of moose shooting off in the MMU plan</td>
<td>61%</td>
<td>60%</td>
</tr>
</tbody>
</table>

As evident in Table 15, the MMUs that have existed longer (i.e., over seven years) have not shown greater improvement in calculating moose shooting off than those MMUs that have existed a shorter time. As it is assumed that learning takes time and the EPA recommends CAB review MMU plans every third year, it was assumed that this would allow for the active in MMUs to adjust plans if they had existed at least seven years. The results indicate that, at least so far, the MMU managers have not improved their skills at calculating shooting off. Table 16 shows that the number of
management measures is a little bit higher for MMUs that have existed for a longer time.

Table 16. Number of management measures performed by MMUs over time.

<table>
<thead>
<tr>
<th>MMUs that have existed from 1 to 6 years.</th>
<th>MMUs that have existed 7 or more years.</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 management measures (median)</td>
<td>10 management measures (median)</td>
</tr>
</tbody>
</table>

Table 16 shows that more management measures are noted in the MMU plans that have existed longer. This also indicates that MMUs do indeed conduct more management measures over time.

One question in the CAB questionnaire inquired whether respondents thought the quality of the MMU plans had improved during the last five years. Ten respondents answered yes, six no, and three that they did not know. As many as six CAB hunting administrators do not believe that MMU plans have improved over time, which is an indicator that the local appropriators do not learn more as time goes by. One respondent asserted that their and the hunting consultants review of the plans did improve the quality of the plans.

When we comment the plans we show that the document is an important tool for the management of the MMUs. The quality improves in the succeeding plans both from the MMU in question, but it also affects the plans for other MMUs (CAB questionnaire).

This quotation illustrates that the review procedure seems to improve the quality of the plans. The adaptive co-management literature points out that one of the tasks of the public administration is to provide scientific information to local resource users. In this instance, it is therefore reasonable to assume that the CABs can—by informing the MMU—also assist in the improvement of their performance, such as by educating them as how to calculate correct shooting off. In the next section, the existence of LEK and learning by the local resource users will be discussed.
As previously described, the adaptive co-management approach highlights the fact that local appropriators often possess LEK that can be valuable in the management of natural resources. LEK is a combination of scientific knowledge and place knowledge. Therefore, it is of interest to investigate what education pertaining to wild care and hunting Swedish hunters might have.

In order to receive a gun license in Sweden, a person needs to obtain a hunting certificate. The government can issue directives of obligations to pass an examination regarding knowledge and ability to shoot as conditions for hunting (1987: 259 §40). The theoretical test shall consist of a questionnaire with questions decided by the EPA (NFS 2005: 4 12 §). The theoretical test shall contain 70 questions pertaining to the following subject areas: knowledge of species, hunting laws, ecology, wild care, and so on (NFS 2005: 4 13 §). Therefore, the Swedish hunters are required to partake of some formal education regarding issues such as species and ecology; however, the main focus is on guns and shooting.

Several perspectives of the LEK concept have been highlighted in the interviews with the regional actors in the moose administration. The following points will be discussed in the next sections: 1) the importance of spending time in the ecosystem, 2) generational differences, 3) the incongruity between scientific inventory methods and LEK, and 4) the potential for learning.

One aspect is the amount of time people actually spend in ecosystems, which has been highlighted as critical in gaining LEK. Hunting is a recreational hobby today; no one needs to hunt in order to put food on the table. This differs from, for example professional fishing, in that it is not a primary source of income to households. However, it is often brought up that hunting is part of the culture, specifically in certain areas in Sweden today; therefore, it has a more profound meaning for people than only that of recreation. Many of the interviewees stated that possessing LEK depends on the time spent in the forest and whether an individual is a 'hobby' hunter.
or not. Hobby hunters are those hunters who spend a few weeks per year hunting and are only interested in shooting moose.

Permanent residents see wildlife all year round and know how wild animals act, and has a completely different feeling…one has a better sense of what kind of moose there are on the hunting grounds…if you come as a hunter from Stockholm you don’t know anything of what is out there, and therefore it is impossible to have a conception of what one should shoot (interview 5).

Some of the actors brought up the fact that the older generation spends more time in the forest than the younger generation (interview 3). However, it also seems that it is the older generation that has a more difficult time learning and understanding scientific knowledge (interviews 3, 5, and 9). One probable explanation is that younger generations in Sweden have higher levels of education and therefore probably understand scientific findings more easily. One interviewee claimed that it is not only a question of education, but also about the attitude one has (interview 9).

Although many people have knowledge of moose, it is limited to their specific geographical area; therefore, it is not possible to generalize this knowledge. However, the fact that people do “generalize” LEK—i.e., they believe that what they perceive on the local hunting grounds is applicable to larger geographical areas—is a problem, according to a forest company employee (interview 9). This brings up the perspective of combining scientific knowledge that is possible to generalize with LEK that is time and place dependent. Problems in combining these two types of knowledge have previously been discussed, however, with a focus on communication problems between researchers and local resource users and the practical problems of combining these two types of knowledge (Pålsson, 1998). Yet another problem—and perhaps more serious in nature—became prevalent through the interviews.

One problem that was brought up in many of the interviews was that incongruities existed between LEK and scientific inventory methods (interviews 17, 11, 9, and 14). A forest company employee expressed this set of problems in the following way:
No, I don’t believe there is local ecological knowledge. You can know certain things of your area but moose migrate over so large areas. I will use myself as an example. If I am shown inventory statistics of the area where I hunt I immediately get the feeling that this information is incorrect…it is not easy to accept inventory statistics of your own area, it feels like you know better yourself (interview 17).

In other words, it is hard to believe inventory statistics if these contradict one’s LEK. This makes it more difficult to combine scientific methods with LEK. However, not only does this ‘tunnel vision’ that is created by spending time out on the local hunting grounds make it harder to accept scientific findings, if contradictory, it also creates emotional tension.

Every time that you are at meetings people will relate to their own hunting team and that is their picture…even [name of an EPA employee] relates to his own hunting team…everyone has a picture and it is from their own surroundings…the feelings take over when you start discussing these issues and it becomes so damn personal, and it is difficult to remember that in this instance I am representing this organization, and this is not about me personally (interview 11).

Resource users seem to have a difficult time accepting the results of inventory statistics if it contradicts what they actually perceive when spending time out on the hunting grounds. This is of course due to the fact that moose is such a mobile animal; however, it might be a serious problem in a natural resource management system, especially if there are conflicts among appropriators. As discussed, difficulties associated with questionable information pertaining to population status make it difficult for appropriators to agree on rules, thereby increasing incentives to free-ride (Blomquist, Schlager et al., 2000).

In both the interviews and the CAB questionnaire, lack of knowledge was highlighted as a reason for inefficient management of MMUs; therefore, the question of learning becomes important. The hunting consultant in County A had together with the CAB hunting administrator arranged meetings with MMU representatives in order to educate them regarding, for example, how to calculate moose shooting off. He stated that you have to provide the information for people since they do not actively seek it out and believed in a moose administration with experts to steer and inform since there is always an influx of new people (interview 8).
Some interviewees talked about the inertia of bringing out new information and perspectives to all hunters. In addition, the fact that it is not easy to alter the attitudes of hunters was mentioned by several interviewees (interviews 14, 19, 11, and 9). The CAB hunting administrator in County B stated that they realized that it takes a really long time to implement a change whether it is an alteration in a law or a concept as there are so many people who hunt and not everyone is interested (interview 11). A forest company employee stated that changes are hard to implement as many hunters and hunting teams appear to be extremely conservative (interview 9). One hunting consultant expressed the following regarding information spreading:

[…] I am chastened after 30 years. I believe information to be damn difficult. The information is not always current when you are out with your gun (interview 14).

A chairman of a MMU (made up by three WMAs constituted by mostly private land) discussed the learning process, stating that the hunters continuously discuss everything from monitoring methods to harvesting strategies and grazing pressure in diverse settings, such as by the fireplace, at WMA meetings, at ÄO council meetings, in study circles, or in local forums in which the chairman participated. The chairman had established a database containing information on the number of moose shot, the location of the shooting, the person shooting, and so on. He could calculate different future scenarios of the moose population depending on the harvest strategy. Hunters expressed surprise when they, four years ago, were able to shoot several large bulls (every hunter’s dream is to shoot a big bull with antlers) and wondered where those bulls had come from. The shooting off statistics revealed that they had decreased the percentage of bulls shot from 75% to 50-60%, and the chairman stated that this decrease had entailed a larger population of mature bulls. As hunters had gained extensive management rights through the establishment of the ÄO, more hunters were interested in learning; they also applied a longer time horizon when planning their harvesting strategy according to the chairman (interview 2). This MMU chairman is a typical key steward, which is highlighted as important for the development of adaptive co-management systems (Olsson, Folke et al., 2004). Many
of the interviewees were quite convinced that management success could be attributed to the interests of individuals such as the MMU chairman (interviews 9, 14, and 19). If the success of MMUs can be explained by the efforts of engaged individuals, what then can explain regional variations? This will be discussed in Chapters 10 and 11. In the next section, the regional variations in the level of adaptive co-management systems will be examined.

9.7 REGIONAL VARIATIONS

As demonstrated thus far, some MMUs have more adaptive co-management features than others. Therefore it was also investigated whether differences exist among the adaptive co-management systems in various counties. One aspect that was examined was whether there was a difference in the amount of management measures taken by MMUs in different counties. As illustrated in Diagram 4, the median number of management measures taken by the MMUs in the diverse counties varied significantly.
Diagram 4. Management measures of MMUs in different counties.

As Diagram 4 indicates, in eight counties the median number of activities taken by the MMUs was six or less while in another eight counties the median number of activities taken was ten or higher. This is quite a substantial variation and indicates that there is a difference in the level of activity—not only among MMUs, but also county-wise. However, part of the explanation might also be the fact that CABS’ administrative routines are diverse in various counties.

However, there are also variations among counties regarding the percentages of MMUs that for example calculate correct shooting off numbers of moose. For example, in Norrbotten County as many as about 80% of the MMUs calculate correct moose shooting off while in many other counties it is about 50%. This can be compared to the fact that 61% of all MMUs can calculate correct moose shooting off, as illustrated in Table 5.
9.8 To what extent are MMUs adaptive co-management systems?

“To what extent are Swedish MMUs adaptive co-management systems?” This was one of the questions posed at the beginning of this thesis. The results thus far indicate that MMUs are not particularly adaptive. Among other things, this is indicated by the low levels of management success. In Table 17, the initial question is illustrated by means of the previously discussed indicators.

Table 17. Degree of Adaptive co-management

<table>
<thead>
<tr>
<th>Adaptive co-management criteria</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management success</td>
<td>About half of the MMUs have low or no management success in reaching their management goals</td>
</tr>
<tr>
<td>Monitoring</td>
<td>About a quarter of the MMUs do not utilize any monitoring methods</td>
</tr>
<tr>
<td>Ecosystem management</td>
<td>About half of the MMUs do not apply ecosystem management</td>
</tr>
<tr>
<td>Management measures</td>
<td>Most MMUs take about half of the theoretically possible management measures</td>
</tr>
</tbody>
</table>
| Learning                       | • MMUs have taken more management measures if they have existed longer.  
|                                 | • MMUs are not better at calculating correct moose shooting off if they have existed longer.  
|                                 | • The potential for learning is dependent on numerous factors, including among others the presence of key stewards. |
| LEK                            | LEK is local and can inhibit the acceptance of the results of scientific inventory methods. |

About half of the MMUs had low or no management success—that is, they are unsuccessful in meeting their identified goals and objectives. Is this high or low? Despite the fact that about half of the MMUs have existed since 1996 and therefore have had about ten years to acquire skills such as calculating correct moose shooting off, half of them have not managed to do so. This denotes that in about half of the Swedish MMUs its actors do not possess basic knowledge of population dynamics,
which is necessary in order to decide moose shooting off numbers. Somewhat surprising is the fact that forest companies are no better at calculating moose shooting off even though this task is performed by forest company employees. The fact that MMUs that have existed for a longer time period are no better at calculating moose shooting off numbers means that poor processes of learning have been common. Since about one third of the moose population is decimated via the yearly hunt, the fact that so many MMUs are not able to calculate moose shooting could have severe consequences for the vitality of the moose population. This can be especially problematic considering that the percentages of bulls in the moose populations are fairly low.

Despite the fact that many MMUs consider it important to increase the percentages of bulls, they have not succeeded in doing so. One reason for the low percentage of bulls is the fact that MMUs are geographically small, leading to a sharing of bulls to a large extent. The fact that the majority of MMUs share 40-60% of the bulls calls for a better cooperation between MMUs regarding joint harvesting strategies in order to ensure appropriate bull shooting off, especially as so many MMUs are not able to calculate correct moose shooting off. The fact that moose is such a mobile resource places great demands on the utilization of reliable monitoring, which will also be discussed.

The policy intention behind the establishment of MMUs was to ensure a greater landowner influence over the moose populations as well as allow for local variations in the size of the moose populations (Prop. 1990/91:9). This should also have entailed that forest companies could ensure that there was no overly extensive grazing damage on their land; however, this seems to still be a problem. About 28% of the MMUs consider the grazing damages to be significant and are therefore unsuccessful in reaching their objective regarding the amount of grazing damages. In contrast, private landowners consider the amount of grazing damages to be smaller or more acceptable than forest companies, which is an indicator that forest companies might have a difficult time acquiring hunters leasing hunting rights on their land to shoot their assigned moose quota.
Monitoring is a critical management measure that needs to be taken if resource users are going to be able to have any idea as to the amount of resources available for harvesting. Monitoring of moose is complicated due to factors such as scale, the time and effort it takes to conduct monitoring, and the lack of understanding among many hunters of basic statistical concepts underlying monitoring methods. Twenty-six percent of the MMUs do not utilize any moose monitoring methods. As many of the MMU plans lack adequate data, this figure is believed to be somewhat higher. One problem with Älgobs, for example, is that it only has high validity if conducted on very large geographical spaces (i.e., larger than the majority of MMUs). However, the costs of conducting monitoring is also a problem according to many of the interviewees; not even forest companies perceive that they can afford airplane monitoring as frequently as they wish. There is not enough money in the moose administration county funds to conduct this kind of monitoring either, even on a seldom basis. It seems that the activity of monitoring would improve from being coordinated to a much higher degree and that there are possibilities for achieving a higher cost-effectiveness if there is an evaluation and education of the use of various monitoring methods.

The lack of reliable inventory data and whether they are questioned due to the fact that they contradict LEK is a serious problem and needs to be dealt with in order to avoid behavior that will ultimately result in non-sustainable resource utilization. How is this to be taken into consideration by, for example, the public administration in an ‘ideal’ adaptive co-management structure? It also seems that there is a lower chance for LEK to prosper since it is mainly the older generation that is spending substantial time out in the environment while the amount of recreational hunters is increasing. The potential for learning also seems dependent on the interest in the activity and whether hunters possess management rights; for example, hunters on forest company grounds seem reluctant to performing monitoring and so on.

About half of the MMUs do not apply ecosystem management. The focus is still on single-species management, which is apparent from the fact that very few MMUs have any form of ecosystem management. In other words, they do not pay
much attention to other variables in the ecosystem, which is a major difference between adaptive co-management and conventional resource management. For example, one way to ensure that biodiversity is not threatened by moose grazing damage would be for resource users to utilize local grazing inventory methods; however, only 23% of all MMUs do this. It is very likely that this result, in part, can be explained by the single-minded focus both forest representatives and hunters exhibit. Presumably, neither has a truly holistic view of ecosystems as their primary interests are economically valuable tree species or ensuring hunting opportunities, respectively. The priority for socioeconomic factors to those of biodiversity has also been prevalent in other studies (Kellert, Mehta et al., 2000). As already discussed, ecosystem management can be applied on separate levels; although many MMUs do not apply ecosystem management, the regional public administration might. This will be discussed in Chapters 11 and 12.

The amount of management measures taken by MMUs can be higher, however, even though the amount has increased over time. There seems to be a role for the public administration in the sense that it could exert higher demands on the content of the plans and what measures MMUs should take and—perhaps most importantly—educate them in regards to how to calculate shooting off.

Establishing MMUs is voluntary, and the greatest incentive for hunting rights owners should be the right to decide the number of moose to be shot. However, the median sized MMU is about 10,000 hectares, although moose habitats stretch from 500 to 3,000 hectares and are migratory animals. This is clearly a mismatch of the social and ecological scale. Landowners and hunters have managed to achieve collective action resulting in fairly large MMUs, although they are not large enough for managing moose populations. This of course is problematic. Therefore, it is critical to have linkages among MMUs as previously discussed regarding, for example, the necessity of the joint harvesting strategies of bulls. Another possible solution would be to have minimum size requirements of MMUs, as discussed in the bill (Prop. 1991/92:9). However, this probably would have meant that fewer MMUs were established since the ‘ideally ecological sized’ MMU might not be easy to establish via
voluntary cooperation among hunting rights owners. Thus, benefits of local systems—such as the establishment of rules appropriate to local circumstances, face-to-face interactions leading to higher levels of trust, efficient sanctioning systems, and so on—would be lost. For example, many interviewees highlighted the fact that flexibility regarding rapid adjustments in moose shooting off was now possible. Some MMUs had also managed to establish allocations based on ‘biological grounds’ rather than on ‘social grounds’. Yet another problem might be the lack of legitimacy for a decision that in reality would signify the dissolution of today’s MMUs.

This study shows that local resource systems cannot be expected to develop into adaptive co-management systems solely by decentralizing management rights and especially not when the resource is mobile and resource extraction evokes high subtractability. The fact that there is a lack of monitoring on appropriate scales, a lack of knowledge regarding both monitoring and basic population dynamics, and a disinterest in biodiversity means that it is not reasonable to expect people in an industrialized country who are primarily engaged in a recreational activity to be able to manage sustainable resources with an ecosystem perspective.

However, there are differences among MMUs; some resemble adaptive co-management systems to a higher degree than others. According to many of the interviews, one reason for the difference in the individual success of MMUs is the personal attributes of the active people within the MMUs. Another finding is the detection of regional differences in the extent to which MMUs can be characterized as adaptive co-management systems. This regional variation could perhaps be explained by the actions and strategies employed by the counties’ regional moose administrations.

As previously discussed, the state has a role to play in adaptive co-management systems. Many of the assignments of the public administration highlighted in the adaptive co-management literature seem to be lacking in the Swedish MMUs. For example, the task of ensuring linkages among local resource systems, providing scientific information and management of larger CPRs would most likely improve the performance of MMUs. Since the public administration can play a critical role in the
development of adaptive co-management moose systems, it is important that these be perceived as neutral and objective by landowners and hunters. In the case of MMUs, there is support for the assumption that the moose administration might function better in some counties than others. The central question about what characteristics of the public administration that promotes or hampers the development of adaptive co-management systems will be discussed in the next chapter.
Chapter 10

FAILURE OR SUCCESS: THE ROLE OF THE STATE IN ADAPTIVE CO-MANAGEMENT?

As evident in Chapter 9, due to the fact that MMUs in general are geographically too small to contain their own moose population and local resource users lack the knowledge critical for managing moose populations, the public administration can promote their development into adaptive co-management systems by ensuring linkages between MMUs and providing these with technical and scientific assistance. Therefore, the state has an important role to play in ensuring the development of MMUs in adaptive co-management systems. It has been highlighted that the role of the public administration is quite different in adaptive co-management compared to conventional resource management systems. It has also been argued that it is necessary to incorporate extensive institution building and educational effort if co-management systems are to be successfully implemented (Kellert, Mehta et al., 2000). However, although there were principal alterations in the moose administrative system in the end of the 1990s, none were directed at the formal administrative structure such as the CABs or the role of SAHWM, which are part of the state moose administrative system. As a result, today’s moose management is primarily decided in local resource management systems in many of the Swedish counties.

The regional moose administration is similar in all counties in Sweden, and the same formal rules regulating MMUs are presumably applied uniformly throughout the country. However, in Chapter 9, it was concluded that, not only were there variations in the level of ‘adaptiveness’ among MMUs, there were also differences among counties; in some counties MMUs had more characteristics of adaptive co-management systems than in other counties. The second question posed in this thesis
pertains to what characteristics of the public administration contribute or hamper the
development of adaptive co-management systems. This is the topic of this chapter.

This chapter is based on the national CAB questionnaire. One important aspect
is that conflict levels do not seem to be automatically reduced by the implementation
of co-management systems, but rather can increase due to higher expectations of
individuals and organizations (Kellert, Mehta et al., 2000). Therefore, the level of
conflict regarding the moose issue will first be discussed as high conflict levels might
mitigate successful development of adaptive co-management systems. However, the
vertical integration of MMUs into the regional moose administrative system will also
be analyzed. As already argued, as MMUs are too small to contain their own moose
populations, it is critical that they do not become isolated local resource systems.
However, as many MMUs show a lack in knowledge and skills, it is important that
the administrative system can counteract some of these problems. This chapter will
therefore describe the situation at the national level and provide a background for the
county case study that will be discussed in Chapter 11.

The chapter is organized around three sections, namely: 1) level of conflict; 2)
integration of MMUs in the regional moose administration; and 3) administrative
routines in handling MMU plans.

10.1 THE LEVEL OF CONFLICT

There can be various dimensions and constellations in relation to conflicts regarding
the moose hunting question. For example, there might be conflicts between the two
hunting interest organizations, one reason being that SAHWM has been delegated the
official assignment to lead wild care management in Sweden. Another potential source
of conflict between the hunting interest organizations is the question of B-licenses (for
further discussion of this issue, see Chapters 6 and 7). The existence of B-licenses is an
important question for Hunters National Association–Countryside Hunters (NHA)
while SAHWM considers these to be unfair in terms of moose allocation and has also
voiced concerns that these might have negative impacts on moose populations (Prop. 91/92: 212).

There might also be contradictory perceptions as to the size of the moose populations between state agencies, such as the CABs and the FAs. As evident in the “bargaining section” (see Chapter 6.3), the FA pursued forest industry interests while the CABs and the EPA took a more neutral position. Another possible conflict might be between forest and hunting interests versus nature conservation interests. In many of the comments of the official investigations and the EPA report, some interest organizations and universities highlighted the importance of ensuring the representation of the nature interests on equal grounds, such as in the Wildlife Management Boards (WMB) and local forums. Nature interest organizations might object to certain forestry practices or overly large moose populations in respect to the threat to biological diversity that extensive grazing damages poses.

However, the biggest source of conflict is the fact that moose cause grazing damages and thereby diminish the returns to the forest sector. As described in previous sections, the large moose populations in the mid-1980s led to changes in formal rules in order to promote the forest sector interests. Such measures included the abolishment of grazing damage reimbursement, establishment of local forums, appointments of forest sector representatives to the WMBs, and the establishment of MMUs. The intention behind all these policy measures was to ensure that the forest industry interests would have a real influence over the size of the moose populations. These policy measures also meant that the size of moose populations was to be negotiated between the two major interests. In the following sections, the level of conflict regarding the moose management issues will be analyzed.

**Conflict level on the national level:**

Two questions in the questionnaire sent out to hunting administrations in Swedish counties dealt with the issue of the overall level of conflict regarding moose hunting. The first question inquired as to what the respondents believed the general conflict level regarding moose questions in the county to be like. Four respondents stated that
they perceived that the moose hunting conflict was high in their counties, and thirteen stated that it was to some degree conflict filled; one respondent answered did not know. None of the respondents answered “no, not at all”. Thus, the majority of the hunting administrators do perceive the moose hunting conflict to exist to varying degrees in their counties.

The second question inquired whether the respondents thought the level of conflict regarding moose hunting in their county had changed. Seven hunting administrators stated that the level of conflict had declined while seven considered it unchanged. Two respondents were of the opinion that the level of conflict was higher\(^{55}\) while three answered that they did not know\(^{56}\).

**Dissenting opinions in the local forum protocols:**

Another indicator regarding the level of the conflict in the counties is how the local forums function. As previously mentioned, WMBs are recommended to follow suggestions emanating from the local forums when giving recommendations to the CAB relating to moose shooting off and length of the hunting period (NFS 2002:19 §29 point 7). This is an opportunity for hunting and forest interests to achieve agreement as to the size of the moose population without the “interference” of the WMB or the CAB. Dissenting opinions expressed in the local forum protocols is an indicator of the conflict level between the forest sector and the hunting interests regarding the size of the moose population. There can be dissenting opinions regarding moose shooting off, the length of the hunting period for B-license areas, and the length of the hunting period for other hunting areas.

In the spring of 2006, 324 local forums were held throughout the country. There were 74 instances of dissentent opinions stated in the protocols from the local

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\(^{55}\)The reason behind two respondents stating that they perceived the moose hunting question to be more conflict filled might be due to the fact that the county governor has abolished decisions of the CABs quota allocations (Conversation with Göran Bergqvist, ungulate specialist at SAHWM).

\(^{56}\)Some respondents chose to comment on this question. According to one respondent, the decline in the conflict level was due to the alternation of generations, increase in knowledge, and information. The reason for the high level of conflict was the tension between the hunting interests and forest sector in areas with significant grazing damages and uncertainty in relation to the actual size of the moose population, according to one respondent.
forums (Lundvik, 2007). Therefore, it seems as if the participants in the local forums in Sweden in 2006 to a great extent agreed on questions such as moose allocations and the length of the hunting period.

Conflicts between the hunting interests organizations:
As previously mentioned, SAHWM has been official assigned to lead wild care in Sweden through parliamentary decisions, which has resulted in a dominant position in relation to NHA. One question in the CAB questionnaire inquired what the respondents perceived the cooperation between the two hunting interest organizations to be like.

Seven of 19 respondents claim that they do not know what the cooperation between SAHWM and NHA is like. Four CABs stated that they perceived the cooperation to be good and three acceptable. Only one respondent perceived the cooperation between the two hunting interest organizations to be imperfect.

Obviously, “the moose question” is not free of conflict in a national perspective. However, there are differences among counties that probably in a large part can be explained by the significance of the forest sector in diverse counties. However, none of the hunting administrators believed that the moose question was free of conflict in their county. Therefore, the level of conflict is something that should be considered when altering the moose management system as, if ignored, this can mitigate successful implementation of adaptive co-management systems.

The second factor assumed to have affected the development of adaptive co-management systems is how integrated the MMUs are in the regional moose administration. Therefore, in the next section, an analysis of the level of integration of the MMUs in the regional moose administration will be presented.

10.2 THE INTEGRATION OF MMUS IN THE ADMINISTRATION

Local resource systems facilitate, among other things, the establishment of local rules, effective monitoring and sanctioning of rules, information collection, and rapid
responses to changes in ecosystems (Hanna, 1998; Olsson, Folke et al., 2004; Ostrom, 2005). However, the importance of ensuring linkages both on a spatial and organizational level is also emphasized (Berkes, 2002). Linkages on a spatial level are especially important if the resource is mobile and its utilization results in high subtractability, which is the case with moose (Dolsak & Ostrom, 2003).

Since MMUs extend over large parts of the total hunting grounds in many of the Swedish counties, it is critical to have horizontal and vertical linkages. Vertical linkages (spatial linkages) are important because 1) MMUs are too small to contain their own populations which necessitate coordination on larger geographical scales, and 2) participation in local forums is one way for spreading new management ideas and inventory results as well as facilitating the implementation of joint harvesting strategies. Horizontal linkages (between organizational levels) facilitates: 1) spread of scientific information, 2) coordination of local systems, and 3) provision of conflict solution arenas for solving disputes among local systems.

Vertical integration on the national level:

One question in the CAB questionnaire inquired whether the MMUs were isolated from other management organizations in the county. Fourteen respondents answered that this was correct to some extent, three respondents answered not correct at all, one respondent answered correct, and one respondent answered did not know.

Another question pertained to the cooperation between MMUs and the local forums. As is illustrated in Figure 5, the cooperation between MMUs and local forums can be characterized as good according to nine respondents, seven respondents claim that the cooperation is acceptable, two respondent stated imperfect, while one respondent answered do not know.
However, another important aspect is the vitality of the local forums. If these convene seldom and have a high turnover of participants, it is likely that these will not be efficient as vehicles for ensuring cooperation among separate local moose management systems. The local forums assemble rather sporadically—in most counties, only one time per year\textsuperscript{58}. This makes it difficult to gain benefits arising in frequent face-to-face interactions, such as developing norms of trustworthiness and reciprocity (Ostrom, 2007).

Many respondents of the CAB questionnaire pointed to the general lack of knowledge among the participants in the local forums and the importance of educating them. However, many CABs had or were planning on educating the participants in the local forums (CAB questionnaire and interview 11). Äbin, a research project evaluating the grazing damage inventory method, revealed a general lack of knowledge not only among hunters, but also among employees at the FA, which is responsible for this inventory method, regarding how inventory results should be interpreted as well as implemented. One of the conclusions was therefore that there was a great need for educating the FA staff as well as other participants in

\textsuperscript{58}Only two respondents stated that the forums convene twice a year.
the local forums (Kjellander, 2006:6-7). The FA employee in County B stated that the agency had educated its employees for their participation in the local forums but claimed that hunters many times were ignorant (interview 19). At one of the WMB meetings, a review of the local forum’s protocol took place; the forest company employee and FA employee discussed the inability of the participants in some of the local forums to calculate correct shooting off (WMB meeting 2007-05-21). However, it has also been pointed out that there are great variations in the quality of the local forums within counties (CAB questionnaire).

Another factor that might affect possibilities for connections between local forums and the overall administration is the total number of local forums in a county. If there are fewer local forums, it is easier to have an overview over these and the participants; in addition, costs of—for example—educating the participants in the local forums are not as high.

Diagram 6. The number of local forums in the Swedish counties.
As illustrated in Diagram 5, in six out of 19 counties the number of local forums is less than ten. If there are less than ten local forums in a county, it should facilitate the efficient overview of the local forums by the WMBs and CABs. However, if the number of local forums is larger, it requires a substantial work load to review in detail all the protocols from the local forums. In addition, a larger number of local forums implies a larger number of people involved in the moose administrative system—i.e., a higher number of people need to possess adequate knowledge in order to be able to take appropriate decisions.

It is important to understand that prior to the establishment of local forums it was the SAHWM hunting consultants and County Hunting Associations that were responsible for the preparation of moose allocations to license areas. The changes in formal rules have denoted that the SAHWM has lost much of its power over moose allocations, either to MMUs or to local forums. However, the CAB administrator in County B believed that the district chairman (CHA representative) has—even under the current structure—a bargaining advantage compared to the landowner side due to the fact that they have prior experience in allocating moose quotas and also provides the local forum with shooting off statistics, ÄlgObs, and at times other inventories (interview 11). However, this bargaining advantage of the SAHWM has not gone unchallenged by its opponents.

One study conducted in regards to education of participants of local forums in one county disclosed that the representatives many times do not pursue the interests of their organizations as they do not receive clear directives from their organizations (Hällberg & Saltin, 2006). However, it seems as if the forest sector/landowner side has made efforts to inform participants of the importance of actually pursuing the landowner interests more actively. Forest companies, forest associations in southern Sweden, and the Federation of Swedish Farmers (FSF) have made efforts to educate their representatives and encourage them to promote their interests in local forums (Lundvik, 2007). One of the interviewed forest company employees stated that there used to be few dissenting opinions in the local forum protocols from the forest sector representatives. However, since they had worked hard on this issue, the situation had
improved and the forest sector representatives pursued their interests to a higher degree (interview 17). The FSF has urged landowners to take their responsibility in ensuring that the grazing damages are not considerable by attending annual meetings—whether in WMAs or MMUs (interview 3). One study conducted in 2006 disclosed that 10% of forest company employees considered the forums to function without conflict while the corresponding number for hunters was 27% (Kjellander, 2006). This indicates that it is more difficult for forest company employees to assert their views in local forums, and perhaps the support from their organizations has made it easier for the representatives to take a more active role.

**Key stewards:**

One factor that to some extent could explain the level of integration of MMUs in the regional moose administration is what actor has been a driving force behind the development of MMUs in the county. As previously discussed, key stewards are highlighted as critical in promoting the development of adaptive co-management systems (Olsson, Hahn et al., 2004). The respondents were asked whether there had been a dedicated person working in developing MMUs. Ten respondents answered no, eight respondents yes, however some pointed out more than one actor, and one respondent answered did not know. The next question inquired whether the respondents could specify what type of actor had acted as a dedicated person in working toward the development of MMUs (see Diagram 7).
Diagram 7. Dedicated persons that have worked in developing MMUs.

Four hunting consultants, three forest company employees, two hunting district chairmen (SAHWM County Hunting Association), one MMU chairman, and four “other persons” were considered as dedicated persons in promoting the development of MMUs.

There are two angles in relation to what kind of actor has been promoting the development of MMUs—i.e., a question of linkages to the overall moose administration and a question of legitimacy. If the SAHWM hunting consultants have been a driving force, it signifies that there are automatically linkages between MMUs and the regional administration. As the CAB hunting administrators rely to a great extent on the hunting consultants’ professional expertise in reviewing and improving the MMU plans, their attitude toward MMUs might affect the amount of work they spend on the plans. If the hunting consultant is positive toward MMUs, they can educate MMUs’ chairmen regarding for example population dynamics and how to calculate moose quotas. As SAHWM also organizes the local forums, its willingness to allow MMUs to participate in these is to some extent also dependent on the view of MMUs as an organizational form. Another aspect is that hunting consultants work full time with hunting questions and therefore, unlike hunting district chairmen, for

59“Other persons” included, for example, local actor, individuals within MMUs, and the hunting corps. One respondent wrote a person’s name, but with no accompanying title.
example, have more possibilities to influence actors. Forest company employees might also have education enabling them to gain knowledge pertinent to moose hunting questions. They also work with these kinds of questions professionally, as do hunting consultants; they can thereby more easily influence actors. For example, one of the interviewed forest company employees stated that he worked mostly with hunting questions; he had talked about the dropping inventory method at MMU meetings and it had spread to other MMUs (interview 9).

The question of legitimacy arises in relation to what actors are promoting the establishment of MMUs. The intention behind the establishment of MMUs was to ensure a greater landowner influence; if forest companies’ employees are active, perhaps it is perceived as a landowner tool to a greater extent. If, on the other hand, persons from the hunting interest side are encouraging the establishment of MMUs, their members might view the development more positively. This issue will be further discussed in Chapter 11.

MMUs could be integrated into the regional moose administration to a higher degree in the Swedish counties. However, there are structural problems with the local forums that inhibit effective coordination of moose hunting—namely, a high number of participants who do not possess adequate knowledge and the fact that local forums only convene once a year. Therefore, it is possible to conclude that the only formal vertical linkage is not a sufficient vehicle to accomplish effective coordination. This is also connected to the fact that it is based on the voluntary work of many actors, which might be a general problem regarding natural resource management in industrialized countries, where resource users are not dependent on the resource for their livelihood. How much time can recreational users of natural resources be expected to put forth in managing the resource? As one forest company employee expressed it; “No one expects the golfer to manage the golf course” (interview 17).

Another aspect is that the MMUs’ integration also depends on the view of MMUs held by hunting consultants. If the hunting consultant has been a driving force behind the establishment of MMUs, it probably facilitates a higher degree of integration into the regional moose administrative system. This will be further
discussed in Chapter 11. Another point is the fact that the only ‘control’ the CABs can exert over the local forums is when formally deciding to follow WMB suggestions that in turn emanate from the local forums. However, the CAB does not attend the local forums or organize these. This problem is due to the fact that there is both an interest organization and a public administration that are in charge of the regional moose administrative system; this will be further discussed in Chapter 12.

10.3 Administrative routines of the MMUs

As previously indicated, few formal requirements exist regarding the procedures for administering MMUs. A MMU has to submit a MMU plan at the time of the establishment, and the EPA recommends that the CABs review the plans every third year (NFS 2002:19). This leaves much up to discretion of CABs in regards to how to handle MMUs. There might be quite notable differences as to CABs’ management procedures.

Administrative routines at the national level:

Three questions in the CAB questionnaire pertained to the CABs’ administrative routines regarding MMU plans. The first question researched what the respondents thought of the quality of the MMU plans in general. Eight respondents answered inadequate, eight acceptable, and three good. Eleven of the respondents chose to comment on the question. One respondent’s comments contain many viewpoints that were brought up by other respondents.

Very poor. This can be explained in part due to the fact that the knowledge base is low due to the fact that no inventory has been conducted. Even those MMUs that conduct inventories often have inadequate plans since they seldom know how to utilize their data. The goals in the plans are seldom in correspondence with the harvesting strategies. The goal is often a certain amount of moose/1000 hectares but the harvesting strategies are often aimed at saving large bulls and reproductive cows. In practice harvesting strategies seldom leads to achievement of goals. The insight that this is the case seems to be missing.

The problems in writing a high quality MMU plan are associated with factors such as a lack in basic knowledge of population dynamics, and consequently an inability to
calculate appropriate moose shooting off; indeed, as shown in Chapter 9, only 61% of the MMUs could do this. However, in order to be able to calculate moose shooting off, it is necessary that the local actors know how many moose their land contains, which is not possible without reliable inventory methods. The lack of insight that local resource users exhibit regarding their own inability to manage a moose population can make it more difficult for public administrators to convince them to change their plans if these are incorrect. Although the majority of respondents are of the opinion that the plans are of poor quality, some asserted that the quality of the plans was varying.

The second question concerned the CABs’ reviewing routines of the MMU plans. A regular revision should facilitate improvement of the plans. One question asked the respondents to state how often they had not approved of MMU plans or how frequently they had requested revisions during the last five years. Three stated that they had never done this, and ten claimed that they do this a few times per year; six respondents answered that they do this several times per year. One respondent wrote the following comment: “I have recently been hired and can only establish the fact that it has never been done” (CAB questionnaire). Some respondents pointed out difficulties with actually getting the MMUs to change their plans.

Often when we request a revision of the MMU plan we only receive an elucidation that they perceive matters differently from us at the CAB and that they want to maintain their original plan. We have then at times approved of the plan for another year and requested a revision for the upcoming year.

This quotation illustrates the problem of actually influencing the actions of the MMU representatives that the CAB hunting administrators might have. Therefore, another problem that the respondents perceived was the lack of efficient sanctioning mechanisms. The only formal sanctioning mechanism available to the CABs is of deregistering MMUs.
The third question inquired how often MMUs had been deregistered. In total, six CABs had deregistered MMUs\(^60\); however, in one county, the reason was the inability of a forest company employee to write plans\(^61\) while in another county the reason was internal fighting within the MMU\(^62\). In other words, deregistering is rarely used as a sanctioning mechanism by the CABs. A few of the respondents commented on the fact that it was an insufficient sanctioning mechanism and that it only meant more work since they had to reregister the hunting grounds into other license areas (CAB questionnaire).

There is a lack of solid inventory data, and many local resource users do not possess sufficient knowledge of population dynamics to be able to calculate correct moose shooting off. Some CABs have not had any administrative routines for dealing with MMU plans despite the fact that these have existed for almost two decades and there are EPA recommendations that they review the plans every third year. However, many CAB hunting administrators expressed frustration over the fact that MMUs do not listen to their advice and that there are no efficient sanctioning mechanisms.

10.4 **The state: a success or failure in promoting adaptive co-management?**

As concluded in Chapter 9, the public administration has an important role to play in facilitating the development of adaptive co-management systems. One reason is the mismatch between the ecological and social scale that has arisen due to the fact that the resource is mobile. The public administration should in this case ensure that local resource systems do not become isolated by providing opportunities for linkages. Another important task is to assist the local appropriators with scientific information and education so that these can manage moose in a sustainable way. In order for this to take place, the public administration will have to possess the skills to perform this;


\(^{61}\) Therefore, two MMUs were registered as A-license areas instead.

\(^{62}\) This information was obtained through conversations with CAB hunting administrators at a conference in Uppsala 2007-10-24.
however, just as important is the need for local resource users to find the public administration neutral and objective in order for them not to isolate themselves. There are deficiencies in all the above enumerated factors regarding the regional moose administration at the national level. For example, many structural problems exist with local forums as these convene only once per year and there is a high turnover of participants, which obstructs potential benefits such as trust building and learning. The CABs also lack administrative routines of MMUs in general as these are not reviewed on a regular basis and there is limited assistance given to active MMUs to improve their overall management skills. Moreover, some CABs also highlight the perceived ‘steering’ problem as there is a lack of efficient sanctioning mechanisms for non-adherence of MMUs to CAB recommendations.

In only eight counties the CAB hunting administrators believe that there are persons dedicated to the development of MMUs. Since key stewards at higher jurisdictional levels are important for the development of adaptive co-management systems, this is problematic. Another angle of key stewards is the fact that certain actors, such as hunting consultants, provide certain advantages if dedicated to developing MMUs in comparison to other regional actors since they hold a key position in the regional moose administration, possess relevant knowledge, and work with these questions professionally. Forest company employees also work with these questions professionally; however, unlike the hunting consultants, they do not have administrative assignments in the regional moose administration and do not, for example, review MMU plans or summon the local forums.

As concluded in Chapter 9, not only are there variations in the level of ‘adaptiveness’ among MMUs, there are also differences among counties (i.e., in some counties, MMUs are more adaptive than in others). How can this be explained? Two counties have been chosen to clarify this, one having more adaptive co-management characteristics than the other to allow for a more in-depth analysis of what factors contribute and hamper the development of adaptive co-management systems. The next chapter will discuss the analysis of the results from the case study of the two counties.
Chapter 11

CONFLICTING INTERESTS AND THE DEVELOPMENT OF ADAPTIVE CO-MANAGEMENT SYSTEMS IN TWO COUNTIES

As was argued in Chapter 8, the current moose public administration has characteristics of corporate arrangements and legal-bureaucratic features. For example, the corporate arrangements existing in the current regional moose administrative system are focused on providing arenas whereas the two major conflicting interests negotiate as to moose management decisions. This type of arrangement might function differently depending on the level of conflict—namely, if there is a high level of conflict, this arrangement might inhibit the development of adaptive co-management systems. It is assumed that, if actors in the regional moose administration are in conflict with each other, this will affect the efficiency of the management of the moose populations and, in turn, affect MMUs’ development into adaptive co-management systems. If there are conflicts at the regional moose administrative level, this should inhibit learning, information sharing, and so on as the main focus of the involved actors is likely to be that of defending their interests and positions. On the other hand, if actors at both the regional moose public administrative level and the local level have previous experience in cooperating, it is assumed that this will enhance possibilities for the establishment of well-functioning local moose management systems that are linked both vertically and horizontally. Therefore, the differences between the level of conflict and the management procedures applied by the regional moose administration of MMUs in two counties will be analyzed.
The two counties were chosen because the MMUs in one county exhibited a higher level of adaptive co-management characteristics than in the other county (for further discussion, see Chapter 5). The variables assumed to affect the overall level of adaptive co-management characteristics among the MMUs are the level of conflict regarding the moose question, which in turn is assumed to affect the integration of MMUs in the regional moose hunting administration and the administrative routines in handling MMUs.

This chapter is organized around three sections—namely: 1) the level of conflict; 2) integration of MMUs in the regional moose administration; and 3) administrative routines in handling the MMU plans. The chapter ends with a discussion of whether the level of conflict in the county can explain eventual differences in the integration of MMUs in the regional moose administration and in the administrative routines in handling the MMU plans.

11.1 The level of conflict in the two counties

What is the conflict situation in the two investigated counties like according to the respondents of the CAB questionnaire? In County B, the conflict level regarding moose hunting is perceived to be high and unchanged. In County A, the perception is that the conflict level exists to some degree and is unchanged. In the next section, the level of conflict regarding the moose question will be analyzed through a review of the local forum protocols from the two counties.

Dissenting opinions in the local forum protocols:
A review of the protocols from the eight local forums held in County A between 2001 and 2006 revealed a total of seven dissenting opinions. In one protocol, the SAHWM representative objected to what he considered an overly large moose quota. One forest company expressed two dissenting opinions regarding the length of the hunting period—namely, he deemed the suggested hunting period too short. There were four dissenting opinions expressed by NHA regarding what they considered an overly short hunting period for B-license areas. The low number of dissenting
opinions in the local forum protocols indicates that the participants in the local forums in County A have been able to cooperate and come up with joint suggestions regarding moose allocations and the length of the hunting period.

The local forum protocols in County B were not reviewed first hand as these data had already been collected by Hällberg and Saltin (Hällberg & Saltin, 2006). This earlier study showed a total of 71 dissenting opinions in the protocols from the nineteen local forums held in County B between the 2000 and 2005: 42 dissenting opinions related to the suggested moose allocations, with hunters expressing 10 and landowners 32 dissenting opinions (Hällberg & Saltin, 2006). In addition, 29 dissenting opinions regarding the length of the hunting season was noted by both landowners and hunters (Hällberg & Saltin, 2006). No statistics had been collected regarding the number of dissenting opinions expressed in relation to the length of the B-license hunting period in County B. However, the interviewed CAB employee stated that in 1997, a significant conflict emerged regarding the length of the hunting period for B-license areas. The shooting off number of moose/1,000 hectares was higher on B-license areas than on other types of areas, and the CAB wanted to rectify this situation. The CAB decreased the hunting period from four to three days on B-license areas, resulting in 350 appeals, which implied an enormous work load. The NHA was behind this “coup” and had had people sign pre-written appeals—some signed by people who did not even have registered land (interview 11). As soon as the CAB shortened the hunting period for B-licenses, protests arose; however these “died” as soon as the five-day hunting period was reintroduced, according to the WMB chairman in County B (interview 13).

It is reasonable to conclude after reviewing the number of dissenting opinions from the local forum protocols and the interviews that the level of conflict is higher in County B than in County A. In addition, the number of dissenting opinions in the local forum protocols from County B was high even when compared nationally. This indicates that the local forums in County B can be characterized as arenas in which negotiations between the forest sector and the hunters were contested and that the two parties quite often fail to reach consensus. The next section will review the
interactions between hunting interests and the forest sector based on the interviews conducted with the regional actors in the moose administration.

**Conflicts between forest interests and hunting interests:**

“There are frictions between the forest sector and hunting interests since we are a forest county…” (Interview 11). This statement, made by a CAB employee in County B, supports the assumption that conflicts are more intense counties with strong forest interests. The forest company employee in County B stated the following in reference to the difficulties landowners faced to ensure that their opinions were taken into consideration: “Landowners that participate in meetings, for example at a WMA meeting, and who would like to point out that there are large grazing damages, will hear, loads of bolts in the guns […] we will get that son of a bitch when we get to the forest” (interview 17). Forest companies’ employees live in the local communities and do not want to be known as “moose haters” and risk being socially ostracized (interview 17). Many forest company employees also depend on good social contacts as they purchase lumber from private landowners (interview 17). Very few people, in general, dare to take a stance against lowering the moose populations, and the ones who do are usually already considered “odd” and consequently harmless. However, if a “normal” and quiet person voices similar opinions, he or she risks being socially ostracized (interview 17). However, according to the same respondent at the WMB meetings, there was no problem in asserting views regarding lowering moose populations (interview 17).

According to the WMB chairman, it was almost a “war” between landowners and hunters until the organizations finally realized that it was an untenable situation (interview 13). The hunting consultant in County B made the following comment regarding the local forums: “The forest sector representatives usually come to the forum with the demand to shoot more moose while our representatives try and resist and therefore it does not function well generally” (interview 14). Such statements also indicate a high level of conflict in the county—not only at the local level, but also at the regional level.
In County A, there seems to be a high degree of cooperation not only in the local forums, but also among the representatives on the WMB. The SAHWM hunting consultant in County A believed that the moose question was not characterized by a high conflict level (interview 8). The SAHWM representative stated the following in relation to the degree of cooperation in the regional moose administration:

We have a good dialogue in the county, internally but also with different public authorities, for example the CAB, and the reason could be that we meet in different contexts and often talk to each other...it is important with informal contacts and personal chemistry...however we do not always have the same opinions...but we listen to each others’ opinions (interview 6).

However, not only the hunting interests’ side is positive toward the atmosphere in relation to the regional moose administration. The Federation of Swedish Farmers (FSF) representative made the following statement regarding the general atmosphere in the moose administration in the county:

I believe that the local forums have functioned well, and when we review the local forum protocols in the board it seems as everyone gets the opportunity to speak and we can reach consensus. Our organizations and the hunting interest organizations seem to be eager to handle the question in the right manner and the local forums are an important part of the management structure (interview 3).

There is no real conflict between the forest sector and the hunting interests in the county. According to the FA representative, there is a high tolerance for grazing damages: “I have been surprised that landowners have been so tolerant even when we have had really large moose populations and it is possible to show the financial losses that will arise in 70 to 80 years” (interview 4).

Decisions relating to the size of the moose population in County B clearly have distributional consequences. The forest sector interests are great as it is a county with great forested areas and there are large forest companies. However, at least the level of open conflict seems to have declined in County B among the regional actors during the last years. Although it seems as if the climate on the WMB has improved, it might be harder for individuals on the local level to assert opinions of lowering moose populations. This indicates that, although formal rules permit real influence of
landowners, the existing norms in the communities might be contradictory and thus the social costs incurred for asserting formal rules might be deemed a too high price to pay by landowners and forest company employees. The usage of a certain kind of vocabulary, such as “moose hater” and “hearing the bolts in the guns,” indicates that the actors have strong emotions, which of course can cause the conflict to become personal quite easily. In contrast, the atmosphere among the regional actors in County A seem harmonic, and everyone expresses the desire to show consideration to diverse interests. In addition, it seems that the local forums function without fractions and that there is a high tolerance of grazing damages by landowners.

The next section will analyze the level of conflict among the hunting interest organizations.

*Conflicts between the hunting interest organizations:*

Only one respondent to the national CAB questionnaire perceived the cooperation between the two hunting interests’ organizations to be imperfect and that was in County B. In County A the respondent answered that the relationship between the two organizations was acceptable.

Significant conflict occurred between the NHA and SAHWM in County B in the 1980s and 1990s in relation to hunting periods and moose allocations. The county was notorious for its conflicts, which were exacerbated as the regional actors were also active on the national level according to the CAB employee (interview 11). There was no mention of a conflict between the hunting interest organizations in County A in any of the interviews.63

To summarize, there is empirical support for asserting that the level of conflict is higher in County B than in County A in relation to moose issues. The level of conflict is also high in County B when compared to the national level. The high number of dissenting opinions in the local forum protocols in County B indicates that hunting interests and forest interests often fail to reach consensus. The conflict between the forest sector and the hunting interests is also more intense in County B—

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63There were internal conflicts within NHA in County A; consequently, at the time of the interviews the NHA did not even have a representative on the WMB board (interviews 3 and 8).
that is, more emotional and higher social costs can be inflicted if people break norms. The conflict level among the regional actors in County B had abated from what was described by the WMB chairman as a ‘war’; however, actors still held firm attitudes and expressed strong feelings. The conflict level was exacerbated by the fact that the questions have signified prestige for many of the actors as they also had participated at the national level. In County A, there is an atmosphere of cooperation not only among the regional actors on the WMB, but also at the local level. There are few dissenting opinions noted in the local forum protocols, and there seem to be a high tolerance of grazing damages in the local forums according to the FA employee.

The second factor assumed to affect the development of adaptive co-management systems in the two counties is how integrated the MMUs are in the regional moose administration. Therefore, in the next section, an analysis of the level of integration of the MMUs in the regional moose administration will be presented.

11.2 THE INTEGRATION OF MMUS IN THE TWO COUNTIES

If hunters and landowners have prior experiences in coordinating hunting, this might enable them to cooperate in new organizational forms, such as MMUs. On the other hand, if landowners and hunters are accustomed to hunting on their own, they might be unwilling to start cooperating. One form of cooperation is via the WMAs while B-licenses are one way of avoiding cooperation with other people. If there are many WMAs in a county, this would mean that landowners and hunters are used to cooperating. The WMAs cover about 1/3 of the total hunting area in County A while the corresponding number for County B is about 1/5.

The number of B-license and E-license areas in County B is 1,820 while the corresponding number for County A is less than 10. The CAB in County A has actively worked to discourage the establishment of B-license areas. The hunting administrator stated that, when someone wants to form a B-license area (often due to the fact that the land has changed owners or hunting rights owners), the person has to submit a document to the CAB stating that he or she has asked a nearby license area to
join but has been declined. Failing to produce such a document, they can only register their land as a E-license area (interview 5). These are the formal requirements for establishing a B-license area, which have been strictly applied by the CAB (for more details, see Chapter 7). The CAB has successfully prevented the establishment of B-license areas (interview 5).

In 1995, the CAB in County B initiated a project in order to decrease the large number of registered hunting license areas in the county. The CAB contacted landowners and suggested that they join nearby license areas. However, a common response was that they could not stand a person in the area, and the result of the project was an even a larger number of licensed hunting areas (interview 11).

There is a stronger tradition of cooperation among landowners and hunters in County A than in County B. The fact that many people are cooperating via WMAs as these cover such a large area means that they have experience in coordinating hunting. In addition, the fact that there are so few B-license areas also signifies that people accept that they need to cooperate to a high degree. There are not quite as many WMAs in County B, but there are a large number of B-license and E-license areas, which indicates that this is a popular way to hunt. Many landowners and hunters seem unwilling to cooperate, as indicated by the failure of the previously mentioned CAB project.

One question in the CAB questionnaire pertains to whether the MMUs are perceived as being isolated from other management organizations in the county. The CAB hunting administrator in County A answered no, not correct at all while the hunting administrator in County B answered is correct to some extent. Thus, in County B the cooperation between MMUs and local forums was considered imperfect while in County A it was acceptable with the note that it improved after their participation in the local forums.

County A has a long tradition of cooperation between landowners and hunters—even prior to the establishment of local forums—according to the hunting consultant (interview 8). The hunting consultant ensured that the local forums received the MMU plans from the start, which were supposed to be used as guidelines
for the quota allocations to the A-license areas. The reason that the MMUs did not participate in the local forums, according to the hunting consultant, was that “The EPA did not want the MMUs to participate in the local forums due to the risk of overrepresentation of hunting interests” (interview 8). However, starting a few years back, notice had been sent to the MMUs inviting them to participate in the local forums. Forest companies attend local forums more seldom (interview 8). A review of the local forum protocols revealed that, between the years of 2004 and 2006, at least a few MMUs participated in most of the local forums that took place in the county. None of the interviewed persons in County A mentioned that MMUs had expressed the wish to be outside the public administration, as many of the interviews did in County B.

In County B, the interaction between MMUs and local forums has been much more sporadic. One aspect is that some MMUs do not wish to participate in the regional moose administration. According to the CAB employee, some MMUs have expressed the opinion that “we are MMU and we don’t care about anyone else” (interview 11). In many MMU plans, it is noted that they are cooperating with nearby areas; however, according to the CAB hunting administrator they do not know whether this really takes place (interview 11). A forest company stated that, “MMUs live their own lives and they should also be able to do so” (interview 17). According to the hunting consultant’s view of MMUs:

Yes, people perceive MMUs as isolated units. It is the general view of MMUs. The forest companies have established MMUs to be able to exert control and not have to participate in the local forums… (interview 14).

Another example of the integration of MMUs in the local forums is taken from Norrbotten County, with its significant forested areas and the presence of large forest companies. In Norrbotten County, the MMUs have not been invited to the local forums by the SAHWM; the reason behind this is that they are already represented by landowner and hunting interest organizational representatives according to one
A forest company employee was upset that MMUs had not been invited to the local forums by the SAHWM in the county as he believed it important to ensure coordination of moose hunting over larger geographical areas and claimed that the central SAHWM had welcomed everyone to the local forums (interview 1).

It can thus be concluded that there are many indicators that MMUs are vertically integrated to a higher degree in County A than in County B. A decisive difference is that the hunting consultant in County A has actively supported the establishment of MMUs as well as their integration with local forums. Even at the time when the EPA was opposed to MMUs’ participation in the local forums, these took part of the MMU plans. In County B, a prevalent view seems to be that MMUs either chose to act outside the regional moose administration or that it is perceived as acceptable that they do not participate. This kind of attitude inhibits integration, which is not conducive to appropriately ecological scaled management of moose populations.

**Are MMUs a landowner tool?**

Have MMUs become a landowner tool as was the policy intention of the state? The hunting rights owner can register land as a license area or MMU (EPA 2002: 19 §2). Therefore, it can be either a landowner or a hunting rights owner who establishes the MMU and is active in its management. Whether it is a landowner or hunter’s tool seems to depend on the landowner structure; in other words, in counties with strong forest interests and the presence of large forest companies, it has become a landowner tool, while this is not necessarily the case when ownership is mixed.

The hunting consultant in County B asserts, “It’s a means for the forest company to steer and direct as they wish. They hand in the plan and tell their men what to do” (interview 14). However, according to the forest company employee in the same county, it is the hunting team leaders who control the MMU if there is a high ownership division. As soon as the plan has been approved, landowner meetings no longer take place; it is the hunting interests that rule (interview 17). In Norrbotten

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64 Interview conducted with the hunting consultant Björn Sundgren at SAHWM, 2006-05-10 by Robert Grape.
County, many forest companies have established MMUs and consider these as a tool for controlling the moose population on their land (interview 1).

In County A the situation is described as follows by the SAHWM hunting consultant:

If you look at who is engaged in MMUs, there are very few landowners at the moose meetings...many sit on two chairs but there are few ‘pure’ landowners. The plans are sent to the forest company for approval if they own land within the MMU, so landowners are involved. However, the ones who are chairmen of MMUs pursue hunting interests in the local forums, according to the landowner representatives. Even though the base is the MMU plans, they are looked upon as hunters...and most of the time it is a hunter...at least in this county...I do not know of a chairman of a MMU that is a ‘pure’ landowner (interview 8).

In County A, the hunting rights owners have established MMUs, not landowners. Those active in the management of MMUs are primarily interested in hunting but not timber production. When MMU chairmen participate in the local forums, they represent hunting interests according to the landowner participants. The hunting consultant in County A has from the beginning promoted the establishment of MMUs since he believed in this management organization (interview 8) and has had a finger in the establishment of every MMU in the county according to the CAB employee (interview 5). The hunting consultant is not aware of a single MMU in the county that is managed by a ‘pure’ landowner. Clearly, the policy intentions have been fulfilled in County A; instead of a landowner tool, the MMU is a tool for hunters.

Even if a MMU is controlled by a forest company, it still depends on the hunting rights leaser to actually shoot their assigned quotas—a problem that has been discussed many times (Prop.1991/92: 9 & EPA report). The diverse ways of dealing with this issue are discussed by many of the interviewees regarding two forest companies in County B. One forest company created a heated debate due to its policies regarding hunters leasing hunting rights. The company sent out letters to hunters informing them that if they did not shoot their assigned moose quotas, they would either revoke the hunting contracts or add more hunters to the hunting teams. Some of the interviewees called these “threatening letters” and were upset with this kind of behavior (interviews 11, 15, 14, and 16). Letters were sent to the local press
complaining of the abusive behavior of this forest company, and some hunters were of the opinion that SAHWM was powerless (interview 13). However, one forest company chose to have a dialogue with the hunters on their grounds in order to lower the size of the moose population; this was considered more productive by the CAB hunting administrator (interview 11).

The policy goal of the state when establishing MMUs was to achieve greater landowner influence. However, this has not been fully realized. Many times it is hunters who form MMUs and are active in their management; therefore, it has not become a tool for landowners to control the size of moose populations. Even if forest companies have established MMUs, these might have problems implementing their goals as they are dependent on hunters actually shooting off their allotted number of moose. This illustrates the dilemma of enforcing sanctions on people disobeying formal rules, especially if they are contradictory to norms held by local resource users and the community. This seems to be the case in one of the two investigated counties as forest companies have difficulties in reaching their goals regarding the size of the moose populations, despite the fact that the formal rules prescribe this.

SAHWM hunting consultants placed throughout the country have different views and have also worked differently toward the MMUs. It is likely that this in part is due to the fact that the forest sector and especially the large forest companies are stronger in certain counties and the hunting consultants in these counties have perceived the MMUs primarily as a tool for the forest companies to pursue their own moose policy (i.e., lowering moose populations). Not only in County B, but also in Norrbotten County—which is a “forest county”—MMUs have not been involved in the local forums. There are indications that this view is also held by landowners who have established MMUs in other “forest counties”; they perceive MMUs as an opportunity to act outside the regional moose administration. This conflict denotes that it is more difficult to achieve vertical linkages between MMUs and local forums. In the next section, the administrative routines of the MMUs will be discussed.
11.3 Administrative routines of the MMUs in the two counties

In the CAB questionnaire, the respondent from County B stated that he believed the quality of the MMU plans to be inadequate and that the quality varies significantly. The respondent also stated that the quality had improved “somewhat.” The respondent from County A thought that the quality of the plans was good and that the plans had improved during the last five years. He stated:

We review all MMU plans every third year and about 30% receive some kind of comment that the plan is not followed. For example “not sufficient shooting” too high shooting off in relation to bulls, too low actual shooting off in relation to the planned shooting off (CAB questionnaire).

WMB protocols from the years 2002 to 2006 in the two counties have also been reviewed in order to establish whether administrative routines in handling MMU plans had been discussed at board meetings.

In County B, existing MMU plans were mentioned for the first time in a protocol from 2004. A CAB employee stated that a review of the MMU plans had been conducted and a separate WMB working committee was to be held to discuss the MMU plans (WMB Protocol 2004-05-10). The working committee concluded that, out of 33 MMUs, only 5 approved MMU plans. The working committee suggested a new meeting to discuss the plans and invited forest companies. The working committee decided that a meeting was to be held with all the MMUs and the local forums at the beginning of 2005 (Working committee Protocol 2004-08-17). A CAB employee presented the results of the working committee, and 11 MMUs did not have approved plans. A forest company revised their plans, and the other three constituted mostly private land was revised by the CAB (WMB Protocol 2004-11-12).

65However, the establishment of new MMUs had been brought to the attention of the WMB for the boards' approval prior to this occasion.
66Questions that require expedient handling in the WMB can be delegated to a working committee or the chairman of the board (NFS 2002: 19: §29 p.33).
67There is no reference in the WMB protocols as to whether this meeting actually took place.
In 2006, the CAB employee announced that the WMB working committee would receive an account of the status of the MMUs every year. The WMB was positive toward this working procedure (WMB Protocol 2006-11-27).

In February 2007, a decision was made by the CAB in County B to establish policies regarding the handling of MMU plans as they considered it necessary with improved supervision of MMUs since these cover approximately 60% of the total hunting grounds in the county (interview 11). The new policies signify that the CAB and the hunting consultant should review the plans and compare these to the “three year county moose management plan.” If the MMU plans are not approved, they have to be supplemented by the local actors. An approved MMU plan is in effect for three years; however, the local actors can change the plan if they desire. After the review by the CAB and the hunting consultant, the plans are presented before the WMB board that controls whether the actual moose shooting off corresponds to those detailed in the plan (interview 11).

Since 2006, the hunting consultant in County B offers services to MMUs, larger A-license areas, and local forums that include a computer program that contains functions for calculating moose quotas based on several monitoring results (interview 14). This reliance of CAB administrator on the expertise of the hunting consultants can affect the administrative routines applied to the MMU plans. The forest company employee expressed concerns as to the consequences in relation to the lack of knowledge of the CAB hunting administrators.

The CAB is lacking in competence regarding wild care questions and relies on the SAHWM hunting consultant. Because of this they have not “dared” to be so active and place demands on, for example, MMU plans; however, all of a sudden this change two years back and that was good (interview 17).

In County A, as early as 2001, administrative routines regarding the MMU plans were mentioned in a WMB protocol. In 2000, the WMB requested that the CAB hunting administrator and hunting consultant control whether MMUs followed their plans. The CAB sent out letters to 15 of the 38 MMUs in the county commenting that they were not following their plans (WMB Protocol 2001-05-04). In 2005, the
CAB reduced the hunting administrative position from 50% to 30% due to diminished workloads due to the establishment of MMUs (WMB Protocol 2005-02-18).

The MMU plans have always been reviewed by the hunting consultant in County A, which has utilized a program to calculate moose quotas. If the plans lacked information, they were not approved by the CAB, and MMUs abide by the comments they receive from the CAB (interview 5). In addition, the hunting consultant and the CAB hunting administrator have arranged meetings with MMUs’ representatives in which they among other things have taught them how to calculate moose shooting off (interview 8).

A review of the WMB protocols reveals that administrative routines were in place much earlier in County A than in County B. However, in the last years the CAB in County B has taken steps to develop quite comprehensive administrative routines for dealing with MMU plans and to involve the WMB. One difference seems to be the more active role of the WMB in County A in relation to this question since it was the board that decided in 2000 that the CAB employee and the hunting consultant should follow up the MMU plans. The establishment of MMUs has signified that the hunting administrative was position reduced quite considerably in County A. One point is the fact that there has been a more active and engaged management in County A, primarily by the hunting consultant, who personally believed in MMUs as an organizational form.

11.4 CONFLICTING INTERESTS AND ADAPTIVE CO-MANAGEMENT

The aim of this chapter has been to explain whether specific characteristics of the public administration, depending on the level of conflict, affect MMUs’ possibilities to develop into adaptive co-management systems. After reviewing numerous empirical sources, such as local forum protocols, WMB meeting protocols, CAB questionnaire, and interviews, it becomes evident that not only was the conflict level higher in County B than in County A, but it is also high compared to the national level. The high number of dissenting opinions from the local forum protocols and the fact that County B is a so-called forest county signifies the presence of a substantial conflict
between hunters and the forest sector regarding the size of the moose populations. Some of the regional actors had also been active at the national level and held firm opinions regarding moose management questions, which exacerbated the level of conflict. In addition, there had been a conflict between the two hunting interests’ organizations in County B. There was not a particularly strong tradition of cooperating among landowners and hunters in comparison to County A, neither at the regional nor local level in the county as there are a high number of B-license areas and WMAs did not cover such large areas of the county.

County A on the other hand was characterized by a long tradition of cooperation at the local level as well as among regional actors. Participants in the local forums are successful in reaching consensus, and the regional actors are concerned with creating an atmosphere of cooperation and understanding.

The MMUs in County A were integrated to a higher degree in the regional moose administration than in County B. The main reason for the high integration of MMUs in County A was due to the fact that the hunting consultant was dedicated to the development of MMUs. However, as discussed herein, the MMUs in County A can be defined as a hunter’s tool and not a forest company tool. In County B, the general view of MMUs is that they are a tool for forest companies to control the size of the moose populations. The hunting consultant in County B did not have a positive view of MMUs as an organizational form and had not worked actively to ensure linkages between these and the local forums. However, some MMUs do not wish to participate in the local forums, and there seems to be an acceptance of this stance by some of the interviewees. The vertical integration of MMUs has been affected by the high level of conflict—is this also the case regarding the administrative routines in handling MMU plans?

The difference in the conflict level can also be assumed to affect the administrative routines of the MMU plans. Administrative routines were in place in County A early on and are quite extensive. The WMB in County A has been more active in implementing policies for the management of MMUs than in County B, which is probably due to the high degree of consensus among the participants on the
board. In addition, the hunting consultant and the CAB administrator have been active in reviewing the MMU plans and believe that their recommendations for changes are adhered to. In addition, they have arranged for education for the representatives of the MMUs. In County B, on the other hand, no administrative routines for handling the MMU plans were in place until 2004. The hunting consultant assisted in reviewing the plans, but had not been active in other ways. The forest company employee thought that administrative routines had not been in place because the CAB was relying on the SAHWM hunting consultant’s expertise (interview 17). In County A, the hunting consultant can be defined as a key steward who has had great influence in the development of MMUs.

The corporate arrangements of the regional moose administration have not been an efficient organizational form in promoting the development of adaptive co-management systems in counties designated by a high level of conflicts. As discussed in Chapter 8, the current corporate arrangements are characterized by arenas for negotiations between the hunting interests and forest sector interests. It is likely that high levels of conflicts inhibit aspects such as information sharing, learning, and so on, which are critical in promoting the development of adaptive co-management systems. If the prevalent perception among the actors in the regional moose administration is that of participating in a zero sum game, it will inhibit the chances for the creation of common policies as efforts are primarily directed at ensuring as strong bargaining positions as possible. High levels of conflict seem to disintegrate cooperative forms, which is detrimental perhaps not only for the present time but might come to constitute the institutional path dependency—that is, future efforts of cooperating might be more difficult to achieve. As SAHWM has such a critical role in the regional moose administrative system, it has inhibited the development of efficient management strategies of MMUs in counties with strong forest sector interests. The fact that there is dual responsibility of moose issues on the regional level between the CABs and SAHWM also seem to lead to practical difficulties in developing management strategies that would facilitate the development of adaptive co-management systems.
Chapter 12

REALITY CONFRONTED WITH AN IDEAL TYPE OF ADAPTIVE CO-MANAGEMENT

In Chapter 11, it was concluded that part of the explanation of the difference in MMU integration in the regional moose administration and the administrative routines for handling MMU plans could be attributed to differences in the level of conflict in the two counties. It was concluded that the corporate arrangements were not conducive for the development of management strategies of MMUs and their integration in the regional moose administration in the county with a high conflict level. In this chapter, the current regional administration will be analyzed further at the national level in order to elucidate structural problems that might exist in the current moose administration that may inhibit the implementation of adaptive co-management. Hence, the third central question posed in this thesis will be discussed in this chapter. In what respect do the current structural features of the Swedish moose administrative system differ from structural features highlighted in theory as critical to an “ideal adaptive co-management administrative system”?

In the first section of this chapter, the responsible agencies in the regional moose administration and their relationships will be analyzed. These are the CAB, SAHWM, and the FA. Each section begins with a description of the regional moose administration from a national perspective and is followed by a detailed description in the two counties. It is not a comparison between the two counties; however, it allows for a more nuanced picture since the empirical material of the two counties is more extensive. The second section of this chapter contains an analysis of the differences
between the current regional moose public administration and an “ideal type” public administration as envisaged in the adaptive co-management literature.

12. 1 THE ACTORS IN THE REGIONAL MOOSE ADMINISTRATION

In this section, the responsible actors and their relationships in the regional moose administrative system will be analyzed. Today the division of tasks between the CABs and the SAHWM regarding moose hunting is as follows: 1) CABs are responsible for registering land as hunting license areas and keeping registers of these, 2) CABs take the formal decisions on moose allocations to licensed areas (the exception is MMUs) and the length of the hunting periods for license areas, 3) CABs approve the establishment of Wildlife Management Areas (WMA) and appeals arising from members of these associations, 4) CABs approve MMU plans and are advised to revise these plans on a regular basis, and 5) CABs are responsible for keeping shooting off statistics.

The SAHWM is responsible for the following tasks: 1) administering the local forums and providing these with facts such as inventory results, 2) administering the inventory method ÄlgObs, 3) providing expert advice to the CABs, and 4) having a representative on the WMB.

The assignments of the Forest Agency (FA) are: 1) to have a representative on the WMB, 2) to produce the grazing damage inventory called Åbin, and 3) to summon to the local forums to present the results of Åbin and discuss the grazing damage situation in the hunting district.

The first section deals with the level of knowledge regarding wild care among CAB employees. The second section discusses the relationship between CAB hunting administrators and SAHWM hunting consultants. In the third section the role of the FA in the regional moose administration and its relationship with the CAB and SAHWM is presented. In the section the implications of these findings are analyzed.
**Knowledge of the CAB employees:**

Attention has been paid to the fact that the hunting administrators at the CABs have shown a lack of knowledge regarding wild care and hunting. This was highlighted by the EPA as early as the 1980s when discussing the appropriate placement of hunting questions at the CABs (Prop. 1986/87: 58:228). Some universities also commented on the lack of knowledge in wildlife biology and ecology among employees at the CABs and urged this situation to be changed (Prop. 1986/87: 58:227-242).

Today, there are on average two employees at the CABs who work with wildlife and hunting questions. There are still relatively few employees with relevant university degrees who are dealing with wild care and hunting at CABs. Six of nineteen respondents to the CAB questionnaire had university degrees in environmental/natural science. One of the respondents had a doctorate degree. However, the majority of the respondents only had high school diplomas or the equivalent. All of the respondents who had university degrees in natural sciences had been hired after 2000. It is likely that the positions at the CABs will successively be filled with persons who have university degrees in natural science, especially as many of the CAB employees are close to retirement. Seven of the respondents had less than ten years until retirement, and the average age among the respondents was 51 years old (CAB questionnaire).

In an official investigation regarding SAHWM's general assignment to lead parts of the practical hunting and wild care work, it was concluded that no lack of clarity as to the responsibilities among affected official authorities and SAHWM existed. The SAHWM did not exert public authority. However, the investigator claimed that delimitation questions could arise in the practical execution of assignments due to the fact that there was a lack in competence in wild care and hunting questions at the CABs. The investigator argued that due to the conflicting interests the organization faced it was problematic for the CABs to always consider the organization as a neutral source of facts in controversial decisions. He therefore suggested that a SAHWM...
employee be placed at the CAB as an expert; consequently, a separation of the dual obligations of the SAHWM employees could be brought about (Fransson 2003:28-29). Although the FA and the World Wide Fund for Nature (WWF) believed it important to improve the competence among CAB hunting administrators, they argued that the hunting consultant would be perceived as partial and as representing a special interest; thus, they suggested that a person should be hired directly by the CAB (WWF:2003 & Skogsstyrelsen:2003).

Does the lack of knowledge regarding wild care among the CAB employees who make formal decisions regarding hunting affect their relationships with the SAHWM hunting consultants? This will be examined in the next section.

The relationship between the CABs and the SAHWM:

In the early 1980s, the CABs stated that they perceived their cooperation with SAHWM to be positive69 (SOU 1983: 124-126). Much of the preparatory work was conducted by the SAHWM County Hunting Associations (CHA) and the hunting consultants, which was perceived positively by the staff at the CABs (SOU 1983: 21:124-126). In the CAB questionnaire, respondents were asked to state how they perceived their cooperation with SAHWM (see Diagram 8).

69A few of the CABs also claimed that the NHA was asked for comments at times (SOU 1983: 124-126).
Almost all of the respondents indicated that they think they have good cooperation with the SAHWM; one respondent answered acceptable, and one did not know.

There has been close cooperation between the CABs and SAHWM for a long time, and the CAB administrators believe this to function well. Almost all respondents of the CAB questionnaire stated that they perceive the relationship with SAHWM to be good. Although it has since the mid-1980s been pointed out that there is a lack of competence regarding wild care questions and hunting at the CABs, the situation has not changed by deliberately taking measures by the CABs. However, it seems as if the CABs have begun hiring hunting administrators with higher education in natural sciences.

**Relationship between the CAB and the SAHWM in the two counties:**

The relationship between the hunting administrators at the CABs and the hunting consultants in the two investigated counties is close. The hunting administrator in County A described his relationship with the hunting consultant in the following way:
Yes, we get along very well and we see each other at meetings, speak on the telephone, and in the car, and then you have time to talk a lot. I can tell him my personal opinions because I know he will keep my confidence and he can tell me what is going on within the SAHWM and what he privately think of illegal hunting of predatory animals, that he will not say in meetings with other hunters. We warn each other if certain things are going to happen, we have the hot line between us where we can speak in confidence and about things that I can’t tell my superiors (interview 5).

This quotation illustrates a very close relationship—even to the point that they can share confidences about their personal feelings on controversial issues, such as the illegal hunting of predatory animals. In addition, they also work closely in the review of MMU plans. The hunting administrator at the CAB in County B practiced at the SAHWM during the first year of working with hunting questions at the CAB. Although not a hunter himself, the CAB employee accompanies the hunting consultant during the hunting period every year. Therefore, their relationship can be described as close.

The regional actors voiced opinions regarding the relationship between the SAHWM hunting consultant and the CAB employees. The Swedish Society for Nature Conservation (SSNC) representative in County B expressed his view as follows:

The CAB has no biological competence nor does the WMB at all. SSNC have highlighted this problem but nothing has changed. This means that it is management only from the hunter perspective and not from a concern of ensuring biological diversity. The hunting consultant is the called in expert at the WMB meetings and this signifies hunting interest bias. The CAB is not managing only administrating (interview 18).

According to the SSNC representative, the lack of knowledge of the CAB hunting administrators does in practice lead to difficulties in producing policy goals in the management of moose; in addition, this dependency also indicates that hunting interests dominate.

The hunting consultant in County A expressed his influence on the administration of MMU plans in the following manner: “…if I say that the SAHWM has approved the MMU plan then bang! [...] it is approved” (interview 8). The fact that there is a reliance on the SAHWM hunting consultants’ competence might not
only imply a hunting interests bias, but also inhibit CABs in actually pursuing active management of MMUs. For example, the forest company employee in County B believes that CABs’ dependency on SAHWM prevents the development of administrative routines of MMUs (interview 17). As MMUs can choose to act outside the formal regional administrative system, the public administration has to be active in order to prevent MMUs from becoming isolated. If CABs are reliant to a high degree on the hunting consultants for reviewing the plans, and so on, then the question of whether MMUs are integrated depends on the interest of the hunting consultants, as was discussed in Chapter 10 and 11.

In addition, the dual responsibility seems to actually prevent the active and cohesive management of MMUs. None of the CABs had for example computerized or established MMU databases, although these would facilitate the efficient overview and implementation of management strategies. The SAHWM has computer programs for calculating moose quotas and so on, however in County B this service has been offered for only a few years for A-license areas and MMUs (interview 14). One way to effectively increase efficiency of the management of MMUs would be, for example, for CABs to have a database of the MMUs and ensure that moose shooting off are correct. However, once again the dual responsibility seems to aggravate efficient management on behalf of the public administration. Another perspective of the dual responsibility is the fact that the SAHWM arranges the local forums while the CABs do not have role in the administration of these. As was discussed in Chapter 11, this has meant that MMUs have less contact with the local forums in counties with strong forest sector interests and a high level of conflict regarding the moose question. The CABs do not have any authority to direct the work of the employees of the SAHWM or a formal right to demand to get a certain service accomplished for the CAB. This is problematic regarding the management of MMUs, as became evident in Chapter 11. Many of the CABs were dependent on the hunting consultants’ willingness to work with MMUs as they did not have competence to review the plans.

70The fact that none of the CABs have computerized the MMU plans was discovered when these were collected; all had only paper copies of the MMU plans.
The view of the role of the CAB in the two counties:

The interviewed regional actors perceive the role and tasks of the CABs to be administrative and conflict mediation. In many of the interviews, comments about the role of the hunting administrators at the CABs were made regarding their ability to interpret laws objectively and impartially. The Federation of Swedish Farmers (FSF) representative stated the following in regards to the CAB hunting administrator: “He treats everyone in the same manner, and takes matter by matter, and explain that this is the deal and the county is known for treating everyone impartially, and that no exceptions are made” (interview 3).

Several of the interviewed regional actors considered administrative tasks to be best handled by the CABs as well as their main assignment (interviews 7, 8, and 14). According to the CAB hunting administrator in County B, they spend much time on the phone answering questions regarding hunting, such as who has the right to hunt on a certain property. As there are approximately 2,500 registered areas, this entails changes in about 250–350 of these per year due to conflicts, people’s desire to start hunting together, or new owners to properties that already have been registered as a certain license area (interview 11). The hunting consultant in County A claimed that there is a great need for administration of diverse hunting areas and hunting teams; leaving this task to a voluntary organization would be asking for trouble, as has been suggested in the latest official investigation regarding a new moose administrative structure (interview 8).

However, an important role of the CAB is to be impartial in the conflict between hunting interests and forest sector interests according to some interviewees. The hunting consultant in County B stated that he perceived the CAB employees as objective and pointed out that they have at times changed WMB decisions regarding moose allocations and the length of the hunting period (interview 14). The politically appointed chairman in County B thought the role of the CAB to be that of a mediator. “The hunters and landowners should preferably reach consensus and the role of the CAB is to make sure it works […] mediates…” (interview 13).
The CABs and SAHWM have had important roles to play in the regional moose administrative structure since it was first established in the 1930s. Institutional path dependencies that can be detected include the fact that there is still a lack of knowledge regarding wild care issues among CAB employees due to the fact that they have—to a large extent—relied on the expertise of the SAHWM hunting consultants. This in turn has led to the CAB hunting administrators dealing mainly with purely administrative matters such as registering license areas. The position of SAHWM is not as dominating as it was prior to the policy changes implemented in the early 1990s, which included forest sector interests in the administration to a greater extent. However, the current administrative structure might not be conducive for the development of adaptive co-management systems. This will be further discussed in subsequent sections of this chapter. In the next section, the role of the FA in the regional moose administration will be described.

The role of the Forest Agency:

In Chapter 6, it became evident that the Forest Agency (FA) had stronger views on the necessity to decrease the size of the moose populations than for example the EPA or the CABs. This begs the question whether this is also true at the regional level: Is the role of the FA in the regional moose hunting administration solely to pursue forest sector interests?

The respondents of the CAB questionnaire were asked to state how they perceived their cooperation with the FA. As can be seen in Figure 9, nine of the respondents believe the cooperation between CAB and FA to be good, six imperfect, two acceptable, and two did not know.
Diagram 9. Cooperation between CAB and FA

The CAB hunting administrators in general do not cooperate as well with FA as they do with SAHWM (compare to Diagram 8). Six respondents think that the cooperation between them and FA is imperfect. The only formal contact that the CAB employees have with the FA employees regarding moose management is via the WMB. What is the situation in this respect in the two investigated counties?

The role of the FA in the two counties:

The view of the FA in their role as representatives in the WMB is apprehended differently in the two counties as well as among the various parties. In County B, the FA was perceived as being quite strongly biased toward the forest sector interest. The strongest view was expressed by the hunting interest organizations; for example the NHA representative formulated his view of the FA as follows: “They have to exist, but they are almost worse than [forest company name], they do not want to see a moose, overall, in the forest” (interview 15). The SAHWM hunting consultant thought the FA pursued forest sector interests.
The FA is a party in the case… they are damned not impartial. They are on the forest sector side. If there is a protocol from a local forum and the hunter interests has suggested two (moose to be shot) and the forest interests four and it is voted on in the WMB, then the FA will vote on four (interview 14).

The CAB hunting administrator asserts that the FA, after analyzing the results from Äbin, would make statements in the local press calling for the necessity to decrease the moose populations. The hunting administrator does not consider this to be part of the FA’s mission; rather, the assignment of the agency is to produce inventory material of the grazing damages situation (interview 11). The forest company employee is of the opinion that the FA has become better at bringing out the forest sector interests (interview 17). The SSNC representative observed that it was unfortunate that the FA’s mission was to keep moose populations in check and did not pay more attention to the question of biological diversity, although it was of great importance (interview 18).

In County B, the actors are all of the opinion that the FA pursues forest sector interests; however, they have separate opinions as to whether the role of the FA is to take a stance on these issues. The NHA representative and the SSNC representative consider this to be the role of the state agency, while the CAB employee and the SAHWM hunting consultant believe that their task in the regional moose administration was to produce inventory material related to grazing damages caused by moose.

The general view of the FA in County A differs quite markedly. It has previously been discussed that one concern has been that the forest sector representatives promote hunting interests instead of forest sector interests, as many of them are hunters (SOU 1990:60:46; Prop. 1991/92:20). The hunting administrator at the CAB in County A claims that the former FA representative was biased toward hunting interests. He does not believe that delegates representing the landowner interests should be hunters as these interests are already represented. He also mentioned an occasion a few years back when he referred to a statement made by the forest sector about reducing the size of the moose population in half; two people became flustered—namely the hunting consultant and the FA representative. “It was
the hunter in him that reacted” (interview 5). The present FA representative on the WMB also has a great interest in hunting (interview 4).

The FSF representative in County A considers the FA to have a responsibility to ensure continued increased forest production, and that they probably would take an even tougher stance regarding the lowering of the moose populations (interview 3). The SAHWM representative is of the opinion that the FA’s attitude toward moose has become more negative and that there has been a general shift in emphasis toward a pure forest production view; measures such as various forestry clearance methods have not received attention although these could alleviate grazing damages (interview 6).

In County A the FA is not considered a party in the conflict as is the case in County B. The FSF representative and the CAB hunting administrator are of the opinion that the role of the FA is to pursue the forest sector interests. However, forest sector interests have not been pursued by the FA representative due to the fact that this person has a strong personal interest in hunting, according to the CAB hunting administrator.

The CAB hunting administrators do not cooperate as well with FA as they do with the SAHWM hunting consultants. The FA employee in County A stated that during the last five years they had started to cooperate with the environmental division at the CAB regarding biotope protection and nature reservations. However, prior to this the relationship between the CAB and the FA was characterized by competition (interview 4).

The interviews reveal that many of the actors believe that the role of the FA and its employees is to promote the forest sector interests and take a stance in the conflict—in other words, participate in the bargaining that takes place between hunters and landowners. However, some actors think that the role of the FA should be that of producing inventory materials and acting unbiased in the conflict. Overall, there seems to be a weak tradition of cooperation between the FA and the CABs—and not only concerning moose administration, although cooperation has started on certain issues. If there is confusion as to what values the employees are supposed to pursue and if there is no common understanding, this will inhibit efficient
cooperation. This is also a bridge that will have to be built in order to successfully implement ecosystem management.

In the next section, a comparison will be made between the current regional moose administration and an “ideal type” administration in an adaptive co-management system.

12.2 THE REGIONAL MOOSE ADMINISTRATION VERSUS ADAPTIVE CO-MANAGEMENT

This section reviews the differences between the current regional moose administration and ‘ideal type’ adaptive co-management system with regards to grounds of legitimacy of the public administration and its organization and tasks. As discussed in previous chapters, there are various ways of organizing the public administration to gain citizens’ legitimacy, which is critical since it is via the public administration that citizens are forced to submit to the authority of the state. As previously described, the moose administrative system has characteristics of two ideal types: the corporate model and the legal-rational bureaucratic model. Alterations in the type of corporate arrangements had led to a conversion from an administrative system in which only one interest organization was involved to the current system, which is designated by the presence of arenas in which conflicting interests negotiate. In Chapter 4, differences between conventional resource management and adaptive co-management were described and dissimilarities not only on the grounds of legitimacy of the public administration but also regarding its organization and tasks were revealed. This comparison disclosed the complexities in converting a single-species, top-down management system with maximum sustainable yields goals to adaptive co-management systems. Table 18 depicts the differences between the current regional moose administration and an ‘ideal type’ of adaptive co-management system.
Table 18. The regional moose administration versus adaptive co-management.

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<th>Grounds of legitimacy</th>
<th>Regional Moose Administration</th>
<th>Adaptive Co-management</th>
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<td></td>
<td>Maximum sustainable yield and single-species management</td>
<td>Ecological &amp; Social sustainability</td>
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<td>Negotiations between interest organizations</td>
<td>Ecosystem management</td>
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<td></td>
<td>Precise and general rules</td>
<td>Scientific knowledge &amp; LEK</td>
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The grounds for legitimacy of the current Swedish moose public administration are not to reach ecological and social sustainability, but to achieve maximum sustainable yields of lumber and moose. The general wildlife management goal as stated in the Hunting Law is formulated with a focus on the size of wildlife populations relative to public and private interests (SFS 198:259§4). Both the forest sector and the hunting interests want to ensure large extractions of their respective resources within sustainable limits for that particular resource. Ecosystem management is not applied in the Swedish moose management system. Many of the reasons for policy failure regarding natural resource management according to Yaffe are applicable to the current situation regarding the regional moose management administration. Reasons for failures in applying ecosystem management that are applicable in this case include lack of cooperation between various sections of the public administration. Another problem is the fragmentation of information and knowledge as well as of responsibilities and authorities (Yaffee, 1996, 1997). As previously discussed, cooperation between the CABs and the FA is not perceived as good by many of the hunting administrators at the CABs despite the fact that these state agencies both have tasks they perform relating to moose management (CAB questionnaire). The FA employee stated that the relationship between the CAB and FA had been competitive until quite recently (interview 4). Since ecosystem management requires systems
thinking, there is a need to establish the role of state agencies clearly in promoting various values, such as forest production values and environmental values such as biological diversity. According to the FA employee in County A, the production view of nature still prevails even though it is no longer as dominant within the state agency. In 1994, the FA employees started receiving education regarding environmental issues to implement these as part of the process; however, prior to this, it was all a question of producing lumber, in principle (interview 4).

In an ideal adaptive co-management structure, the goal of the management would be to integrate many different aspects into the same system—namely, the application of systems thinking. However, due to the fact that the current system is built up around specific species, it becomes difficult to integrate controversial issues, such as the management of predatory animals. Another perspective of the fragmentation of responsibilities and authorities is the role of the interest organization SAHWM in the regional moose administrative structure. The dependency of the CABs on the expertise of the SAHWM and the fact that these questions are not placed under environmental divisions makes it even more difficult to alter the current system into the direction of a more adaptive co-management/ecosystem management system. These sets of problems were also brought up by one of the CAB hunting administrators.

We at the CAB want a wild care management for all animals, however now we are spread out on different divisions, and there are several directors, and this organization is inefficient. Predatory animals, caged animals, wildlife and moose, everything should be in one place (interview 11).

However, the SAHWM for example has openly criticized the state’s official predatory policy at the same time and many interest organizations are negative toward its substantial role in the wildlife administrative system (SNF, 2004; WWF, 2004). Due to the negative attitude of SAHWM toward the state predatory policy, it has been questioned whether they should have a role in informing the public of predatory animal issues (Emmervall, 2004). The SAHWM clearly has an interest in ensuring its members’ interests of vital moose populations, and thus large populations of predatory animals, are not perceived positively by the organization or its members. The presence
of conflicting interests regarding natural resources inhibits effective implementation of ecosystem management; the situation is aggravated if certain interests have a strong position within the public administration. Therefore, it is important that someone ensure the public interest. However, as already revealed, there is a lack in knowledge among CAB employees, which indicates a great reliance on the SAHWM hunting consultants. Due to the fact that the CAB employees are being replaced by persons with natural science university degrees increases the chances for these to actually being able to state policy goals and have the ability to have a critical view as to information presented by diverse interests’ organizations and especially the SAHWM.

One interesting point is whether the corporate arrangements focus on the hunting and forest sector interests at the cost of excluding ‘pure’ nature interests, thereby cementing values and discourses that perhaps are not suitable for promoting ecological and social sustainability. As both the forest and hunting interests’ discourses are oriented toward a view of nature as a producer of commodities, this inhibits a holistic view of the ecosystem. Is the current administrative structure cementing views of nature that are detrimental to resilience building efforts and are there any chances for alternative discourses to gain ground into the system? A Norwegian official investigation coined the expression “segmentation” as an illustration of the fact that the Norwegian political system could be described as being a collection of segments clustered around diverse areas, such as fishing, agriculture, industry, and so on with participants from a diversity of organizations, such as state agencies, departments, interest organizations, and so on. The participants of these segments shared certain basic values and understandings of diverse situations, and this implies that narrow and defensive sector interests dominated (SOU 1990:44:185).

The Norwegian fishery administration also gains its legitimacy from corporate arrangements wherein a select group of stakeholders participate via a national advisory committee to the Ministry of Fisheries. Although the Ministry of Fisheries can disregard its recommendations, they are usually followed. In the Swedish moose administrative system, the production view is dominating the advisory committee as it is the fishing industry that constitutes the majority; for example, environmentalists
only participate as observers. The focus on economic interests has for example entailed that international recommendations on fishing quotas be exceeded and scientists when arguing before the council usually consider not only scientific data but also what is politically feasible (Mikalsen & Jentoft, 2003).

It is thus reasonable to assume that the corporate structure is cementing views of nature as a producer of commodities, and many believe that the only truly legitimate interests that should participate are the hunting interests and the forest sector. The fact that nature interest organizations are not even called into the board meetings of the suggested moose management areas in the latest official investigation regarding moose management in Sweden indicates that this is still a prevalent view (SOU 2007: 63). The FA has become more of a party in the case in the current administrative structure; it is presumed to take the side of the forest sector and therefore focus on the production part. In some cases the FA representative on the WMB is a hunter and not likely to be agents for forest sector interests (interview 5). Among those interviewed, the SSNC representative is the only actor to highlight the fact that the FA should promote the question of biological diversity (interview 18). FA is supposed to promote other values, such as biological diversity; however, the institutional structure seems to crowd out other values that the state agency should pursue. The role of the CABs is to some extent that of a mediator between the two interests and not pursuing some general public goal although as have been discussed, Sweden has committed to the implementation of for example ecosystem management by signing international conventions such as the CBD.

A similar logic is applicable to the Norwegian fishing administration: “...co-management as hitherto defined and practiced in Norwegian fishery tends to facilitate user-groups at the expense of governmental control” (Mikalsen & Jentoft, 2003). As previously discussed, corporate arrangements are a way for the state to gain legitimacy for its policies within a certain field and facilitate implementation; however, the state also has to ensure that the public interests are the overriding objective. Clearly this becomes a question of legitimacy: Who should represent whom and in what way? The concept of sustainability includes the rights of future generations and ecosystem
management implies that species should no longer be managed separately. Therefore, it is somewhat daunting that the moose administrative system in Sweden is still so focused on excluding stakeholders, such as environmentalists, from having a legitimate role as the economic interests in participating in the management systems. This also calls attention to the difficulties and potential political costs it is going to require to convert conventional top-down resource management systems into adaptive co-management systems. The user-groups that are currently dominating in certain policy fields will not relinquish their power voluntarily as this in practice would probably signify economic losses—at least in the short run. However, ecosystem management and adaptive co-management are focused on the long-term vitality of our ecosystems, which will probably not be achieved without incurring short term financial losses to certain user-groups.

The aspect of local ecological knowledge (LEK) is viewed as critical in the adaptive co-management literature and on the international political arena and is for example promoted in the CBD; however, as already discussed, extensive empirical studies have not been conducted on the existence of LEK in various settings with rigorous methodologies (Davis & Wagner, 2003). Therefore, perhaps the prevalence of useful LEK should be questioned; as this study also shows, it might be problematic to use LEK in management process. There are indications that it might be very difficult to include local observations of the environment regarding a highly mobile resource such as moose—in fact this might actually be counterproductive as appropriators are less willing to accept monitoring results contradicting their own perception of, for example, the status of the moose populations. However, it is also evident that local observations of the environment such as the diversity in the productivity of land can be used in management decisions regarding decisions on the number of moose to shoot more easily by resource users within MMUs than by the regional moose administration. However, this requires that the active MMUs be able to establish rules regarding this issue, which has not always been the case. In a centralized system, it is much more difficult to have detailed information on the local
conditions. Therefore, at least the potential for more appropriate decisions on shooting numbers will be facilitated by the existence of MMUs.

The organization and tasks of the public administration:
As Beetham points out, although the public administration is concerned with the production of two competing values—law and management—the emphasis on either value is dependent on the policy area (Beetham, 1996). There seems to be quite a strong tradition within the CABs to treat hunting issues mainly from a legal point of view—that is, more of a passive role in applying policy rather than creating or reshaping it toward some general political goals. This also entails characteristics of the legal-rational bureaucratic model wherein the grounds of legitimacy are precise and general rules. As frequently highlighted in regards to CAB moose allocation procedures, the ambition seemed to be to achieve some kind of social fairness instead of adjusting these to the productivity of the hunting grounds (EPA report & SOU 2007: 63). The adaptive management literature calls for management approaches that are suitable for constantly and at times rapidly changing ecosystems. Some researchers have called for flexible legislation that explicitly permits experimentation (Jones, 1998). In other words, it easily becomes a conflict if different values are taken into consideration simultaneously, such as the respect for civil rights, as many issues regarding hunting mean some kind of infringement of private property and ecosystem health/sustainability. For example, the systems of appeals used to be fairly extensive; therefore, it is likely that ensuring the legal rights is considered critical by resource users. This potential conflict is probably going to occur more frequently in the future.

In the adaptive co-management approach, one role of the public administration is to act as a mediator when conflicts arise among local resource systems. Decisions regarding “moose questions” are reached in negotiations between landowner interests’ organizations and hunting interests’ organization. The state has a final say if there are disagreements between these two interests as they make formal decisions of moose shooting off, thereby taking on the role as mediator. In the current moose administrative structure, the public administration acts as mediator, however only
between two interests and not as is highlighted in the adaptive co-management system (i.e., providing conflict resolution arenas for local resource systems). The great amount of time that all administrative tasks require does not leave much room for active management, such as formulating regional moose policy goals.

The Swedish moose management structure was established in the 1930s and institutional path dependencies seem to aggravate a conversion of the current system into adaptive co-management systems. The system is founded on two types of public administrations: the corporate model and the legal-rational bureaucracy—both of which have existed since the establishment and also have legitimacy among many of the actors. For example, the existence of precise and general rules with administrative rules granting citizens extensive opportunities for appealing decisions seems to be considered important; however, this conflicts with the demands of high flexibility. Perhaps the most serious obstacle for a conversion is the domination of two interests with a production view of nature and a focus on maximum sustainable yields. The forest sector interests and hunting interests are very strong and considering that the state is the only actor that potentially has resources to provide a new direction for wildlife goals it certainly at this time is fairly powerless due to among other things the inadequate knowledge of CAB employees.

In the case of Lake Racken, when a fishing association developed into an adaptive co-management system, there were no conflicting interests (Olsson & Folke, 2001). In the case of Kristianstad Vattenrike, a new public administration organization was established in order to promote new management ideas that included ecosystem management and adaptive management (Olsson, Hahn et al., 2004). The presence of key stewards was important for the success in the above-mentioned case studies and also seem important in order to promote MMUs to develop into adaptive co-management systems; however, they do not always exist. Problems in converting the current regional moose administration into an adaptive co-management system include the presence of strong conflicting interests, institutional path dependencies, and a view of nature as a producer of commodities held by the powerful actors in the system.
CONCLUSIONS

The overall aim of this thesis has been to contribute to the understanding of the development of adaptive co-management systems and the role the state plays in promoting and hampering such development. Part of the aim has also been to explore the effects of conflicting interests and institutional path dependencies on the development of adaptive co-management systems. Another part of the aim has been to juxtapose structural differences between the current moose administrative system to an ideal type of an administrative system in order to elucidate potential problems in converting so-called conventional resource management systems to adaptive co-management systems. In order to answer the overall aim, three questions were addressed:

1. To what extent are Swedish MMUs adaptive co-management systems?

2. What characteristics of the public administration contribute and hamper the development of adaptive co-management systems?

3. In what respect do the current structural features of the Swedish moose administrative system differ from structural features highlighted in theory as critical to an “ideal adaptive co-management administrative system”?

The answers to these questions can be summarized as follows:

1. Swedish MMUs lack many characteristics of adaptive co-management systems, and many units do not meet their own management goals. This is due to factors such as a misfit between social and ecological scales, poor knowledge of (for example)
wildlife population dynamics, and inadequate monitoring. In addition, many MMUs do not apply any kind of ecosystem management or improve their management skills over time. This study has also revealed that the acceptances of scientific inventory results are aggravated if these are contradictory to local ecological knowledge. However, there are differences among MMUs; some exhibit more characteristics of adaptive co-management systems than others. Regional variations could also be discerned, as MMUs in some counties exhibit more characteristics of adaptive co-management systems, which will be discussed next.

2. This study indicates that the presence of high levels of conflict hampers the development of adaptive co-management systems. The case study of two Swedish counties’ moose administrative systems indicate that high levels of conflict regarding the moose in the current corporate arrangements inhibit efficient implementation of strategies that contribute to the development of adaptive co-management systems. Due to the ecological and social misfit of MMUs, the state plays an important role in ensuring vertical and horizontal linkages; however, this is more difficult to accomplish when there are intense conflicts between the forest sector and hunting interests. The case study also revealed that the presence of key stewards holding key positions in the regional moose administration is critical in promoting the development of adaptive co-management systems. This is accomplished by ensuring linkages among MMUs and between MMUs and the regional moose administration and by providing scientific information to the local resource users.

3. Structural features of the current regional moose administration that differ from those highlighted as critical in an “ideal type” adaptive co-management system include the production view of nature, fragmentation of responsibilities, and inflexibility. The basis for legitimacy in the current regional moose administrative system focuses on achieving maximum sustainable yields of moose and timber, not ensuring ecological and social sustainability. The organization of the regional administration has characteristics of both the corporate model and legal-rational
bureaucratic model. Characteristics of the corporate model have led to institutional path dependencies wherein representatives for hunting and forest interests are the main players, thereby crowding out other interests. The corporate arrangements also result in the fragmentation of responsibilities between the interest organization SAHWM and the CABs, which inhibits efficient management strategies of MMUs—especially if there are high levels of conflict. The moose administrative system is to a great extent focused on the implementation of precise and general rules, which results in employees at CABs dealing primarily with administrative tasks, which leaves little room for flexible management.

13.1 SOCIAL AND ECOLOGICAL MISFIT

What conclusions can be drawn from these findings? The first has to do with the circumstance that social and ecological systems have a tendency to be poorly coupled. Natural resource management is often a matter of achieving collective action among a group of “resource users.” As evident in this thesis, to rectify the moose situation that could be defined as ‘the tragedy of the commons’ in the end of the 19th century, the Swedish state implemented policies aimed at collective action among hunting rights owners regarding moose hunting. The possibilities for hunting rights owners to establish MMUs have meant that these have gained management rights, which are critical as they are a means to control the size of the moose populations. However, the MMUs that have been voluntarily established by hunting rights owners throughout the nation have been too small to contain their own moose population. Thus, there is a social and ecological misfit between the ecological system and the management system that is supposed to handle it. Moose is an animal of high mobility, and collective action on the initiative of local resource users is seldom executed on an appropriate ecological scale. This misfit can easily lead to unsustainable resource utilization if MMUs become isolated from other local resource systems and the regional moose administration. Therefore, the state—via public administration—should ensure linkages among MMUs in order to coordinate hunting strategies and maintain an overall view of the development of moose populations in the counties.
Another option would be to establish minimum size requirements for the establishment of MMUs that would be in accordance with appropriate ecological scales. However, this might cause legitimacy problems among hunting rights owners that today are ‘members’ of MMUs since many would consequently lose their management rights. Since so many hunting rights owners have taken the time to establish MMUs as well as rules for managing these units, it is likely that they would be opposed to losing these rights. Therefore, it is critical that the state ensure legitimacy for a new system among hunting rights owners prior to deciding to abolish MMUs.

13.2 LEGITIMACY

As has been discussed throughout this thesis, legitimacy is important for natural resource management. In order for natural resource management policies to be successfully implemented, it is necessary that the appropriators find them legitimate—that is, they need to be in accordance with the norms and values held by concerned resource users. If formal rules are implemented that are contradictory to the norms of local resource users and detection and sanctioning of rule disobedience is difficult and/or expensive it will lead to rule breaking that in turn causes even higher legitimacy deficits. This often is a problem with top-down centralized natural resource management systems due to the fact that these fail to take into account the norms of local communities (Hanna, 1995). This is the case with the Swedish predatory animal policy as values underpinning it are not in harmony with norms held by people in communities where predatory animals exist (Brå Rapport 2007:32:8).

However, another angle of legitimacy is that values of local resource users, specific communities, or actors in certain policy areas may not be in accordance with values of society as a whole. This means that people who can effectively hinder official natural resource management policies either by disobeying regulations or by being in some manner responsible for the implementation of policies are able to exert a greater influence over natural resource management decisions. Sweden is committed to the implementation of social and ecological sustainable resource utilization, which is
believed to be facilitated by the implementation of, for example, ecosystem management and adaptive management. However, as has become evident in this thesis, these values do not suffuse the current moose administrative system, but rather that of maximum sustainable yields of resources, such as moose and lumber. Since the regional moose administrative system is structured to provide arenas for negotiations between hunting and landowner interests, this means the exclusion of other values. Therefore, it is important to realize that new values and ideas might not be easily implemented, especially if these are not considered legitimate among actors in the system, despite legitimacy in society in general. It is important to realize that the question of legitimacy can also be applied to different levels in a political/social system and at times there might conflicts between the local level and the societal level as to values and beliefs regarding natural resource management issues. This potential conflict is a difficult issue to resolve for policy makers, particularly when local resource users have the potential to break rules easily.

Another perspective of legitimacy is that peoples’ values, beliefs, and norms change over time. For example, at the beginning of the 20th century, the Swedish state was unwilling to implement policies aimed at forced collective action among landowners as it was not considered to be in accordance with prevailing norms (SOU 1997:91). However, today the fact that so many hunting rights owners are used to cooperating has led to a change in values. Today, hunting rights owners share a greater understanding of the need for cooperation, even though it signifies restrictions in possibilities to hunt independently. This particular change in values is vital regarding natural resource management as it facilitates management on ecologically appropriate scales. However, there also seem to be differences in the local landowner/hunters’ willingness to cooperate in various counties in Sweden; this is yet another aspect that needs to be taken into account when policy decisions are made.

Moreover, if a new policy (for example) implies greater management for those toward whom the policy is directed, the decision to abolish these newly gained rights might cause legitimacy deficits. Hunting rights owners gain management rights by establishing MMUs, which clearly has been popular. However a decision to abolish
this might not be perceived as positive, thereby causing a lack of rule adherence. Of course, this is always something that should be taken into consideration when the state plans to implement policies that grant local resource users more authority over the decisions of resource use. Once resource users have gained management rights, it might not be so easy to withdraw this authority—at least not without the risk of causing legitimacy deficits. Therefore, it is crucial that policy makers take into account the particular resource characteristics and contemplate whether it is likely that a social and ecological misfit will arise. This should be done prior to decisions related to decentralizing natural resource management. If such a decision is made, it is also important to develop strategies on how to limit the risks for possible future unsustainable resource utilization.

13.3 INSTITUTIONAL PATH DEPENDENCIES

This thesis has highlighted that it is not easy to change conventional natural resource management systems in order to successfully implement ecosystem management and adaptive management. The historical description in this study elucidates that current institutional path dependencies in the moose administrative system have a long history. The two major interests—land and hunting interests—have been involved since the establishment of the management system in the early 20th century. The landowner interests can claim legitimate interests by reference to property rights and the economic significance of the resource. The hunting organization, SAHWM, can assert its legitimate interests due to the state assignment to lead wild care management in the country. Their status as experts in the field and with a nationwide organization strengthens their position as an interest group. For example, nature interest organizations can only assert their legitimate interests due to the fact that they represent a heterogeneous interest group in society. As two major interests have such a great influence over the moose management system, it has resulted in their view of nature as a producer of commodities, controllable, and so on continuing to dominate today. Due to conflicting interests and the existing corporate arrangements, the system is focused on bargaining; the only interests with access and substantial bargaining
power are the land and hunting interests. This production view of nature discourse also inhibits a transformation of the current moose public administration into a system that takes into account features such as ecosystem complexity, resilience, and non-linearity. The described corporate arrangements also inhibit learning as actors become focused on asserting their interests and bargaining situations risk turning into “one-shot games.” The state has taken on a role of mediator between the two major interests, although the state itself cannot be viewed as a unitary actor as state agencies pursue diverse policies and also to some extent become participants in the bargaining situation.

A pertinent question regarding a possible transformation of the moose management system relates to what incentives the main actors have to change the current system. Currently, no real incentives exist for the forest sector and hunting interests to change the system into ecosystem management and adaptive management, especially since this would include more interest groups such as nature interests. The government, on the other hand, if taking its commitment to the CBD seriously, should have incentives to reorganize the system. However, this would require the alteration of status quo, which is likely to encounter resistance from the main actors and therefore might not be a political price worth paying by a government. As Knight and North point out, altering the formal rules in a society is the result of bargaining between the state and powerful interests groups. Indeed, the forest sector and hunting interests are strong economic interests in Sweden today. If new concepts and views of ecosystems such as resilience, thresholds, ecosystem complexity, and sustainability are taken seriously, it is crucial to realize that this means altering not only current natural resource management systems, but also that views and values held by principal actors in the system need to be changed. This means that this conversion is quite fundamental and can lead to changes in norms, which as we know are indeed difficult to alter and also often impede radical efficient implementation of formal rules if not in accordance.
What has this thesis contributed to in terms of empirical and theoretical insights? First, this study shows that local resource users who are not dependent on the resource for their livelihood—particularly when the resource is mobile—cannot be expected to automatically establish adaptive co-management systems even if management rights have been decentralized. This study also shows that the state plays a critical role in promoting the development of adaptive co-management systems, albeit the organization and tasks of the public administration differ quite significantly to that in conventional resource management.

This study also highlights the importance of combining various theories regarding institutions in order to gain a full understanding of a complex reality that change over time. If the aim is to understand the functioning of social-ecological systems in a specific context, it is important to have a theoretical understanding of what perspectives are most productive. For example, in this study, due to the presence of conflicting interests, Knight’s bargaining theory has been useful in understanding difficulties in achieving intended consequences of changes in formal rules. However, this study also highlights the importance of analyzing the specific content of property rights and changes in the bundles of property rights while simultaneously taking into consideration its interaction with the specific characteristics of the resource. Another important aspect is the role of organizations in the creation of formal rules as well as their “bridging” role between local resource users and their responses to alterations in formal rules. This study highlights the importance of examining in detail the role of organizations as they indeed are the “players of the game”.

In addition, there is always going to be a tension between the demand for flexibility on the part of the natural resource management system and the necessity to ensure legal security. Property rights are formal rules on the constitutional level; there needs to be clear rules regarding infringements on these, otherwise it will aggravate decisions on other decision levels. Public administration decisions need to be made within a legal framework that protects citizens from the arbitrary exertion of public
authority. In essence, this is contradictory to ecosystems’ innate complexity, which might at times require rapid and invasive policy decisions in order to avoid the loss of critical ecosystem services. It is critical to ensure the legitimacy of the public administration; therefore, it is also necessary to contemplate how this can be achieved while simultaneously allowing for management that promotes sustainable resource utilization. To conclude, challenges facing policy makers in order to meet the political goals of ecological and social sustainable development are going to be severe.

The Swedish moose administrative system would benefit from a more stringent national policy and overview. In the current system, there is no overview of the functioning of MMUs, and no one has previously collected MMU plans or investigated administrative routines applied by the various CABs. Prior to yet another major alteration in the moose management system such as the abolishment of MMUs, national policies directed at improving the existing system should be formulated and implemented. An investigation into possibilities of implementing ecosystem management that would include all aspects, such as forestry, wildlife, and predatory animals, should also be conducted.

### 13.5 Research Agenda for the Future

Ostrom warns against striving for blueprint solutions to social-ecological problems. The complexity of social-ecological systems warrants a diagnostic approach in which combinations of variables that will affect actors’ incentives are identified. These variables have to include the resource units, the resource system, and the governance system (Ostrom, 2007). This study demonstrates the complexity of achieving sustainable resource utilization when taking into account aspects of the governance systems such as property rights, norms, resource unit mobility, and collective action. Another complexity that has also been discussed in this thesis is that most variables change over time; therefore, adjustments have to be made in order to meet these altered conditions—whether it is changes in norms or ecological conditions. It is therefore necessary in a ‘true’ multidisciplinary research to accomplish a better
understanding of social-ecological systems. If the goal is ecological and social sustainability, it is necessary for future research projects to include a diversity of disciplines in order to gain a better understanding of both the social and ecological system as well as their interdependence. Without a multidisciplinary approach, it is very easy to miss critical information of variables not easily comprehended due to the fact that it is within the knowledge field of the researcher. This can lead to conclusions that perhaps are theoretically sound within a single scientific discipline, but if implemented would not achieve the intended consequences.

Further research should be conducted on the relationship between local resource units and the administrative system. For example, the views held by the actors within MMUs regarding the formal moose administrative system should be investigated. What actions of the administrative system affect their behavior? How do they perceive the sanctioning system? In what way can the administrative system contribute to their improving their management skills? How do we explain why some MMUs are more integrated in the regional moose administrative system than others?

It would also be of interest to further investigate why some MMUs resemble adaptive co-management systems to a higher degree than others. As has been discussed herein, the process perspective of adaptive co-management is critical and therefore would be of interest to investigate within the MMUs. Is the success of MMUs solely dependent on the presence of key stewards? Why are some MMUs more successful in implementing rules contributing to sustainable resource utilization? Why do actors in some MMUs spend more time and effort on resource management than in others? How do we explain why some actors in MMUs learn more efficiently than others? How is knowledge transmitted among actors within a MMU? Is there an interest for other values than those of purely economic character, such as biodiversity among actors in MMUs? Such questions provide valuable contexts for future research.
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Interviews with members of Wild Care Boards

**County A**

1. Interview with a representative from FSF, 2007-06-01
2. Interview with an employee at the Forest Agency, 2007-03-28
3. Interview with an employee the CAB, 2007-03-27
4. Interview with a representative from SHWAM, 2007-03-29
5. Interview with the chairman of the WMB, 2007-03-29
6. Interview with a hunting consultant at the SHWAM, 2007-03-29
7. Telephone interview with a forest company employee, 2007-05-08

**County B**

8. Interview with an employee at the Forest Agency, 2007-03-28
9. Interview with an employee the CAB, 2007-03-21
10. Interview with a representative from SHWAM, 2007-05-21
11. Interview with the chairman of the WMB, 2007-03-19
12. Interview with a hunting consultant at the SHWAM, 2007-03-20
13. Interview with a representative from NHA, 2007-03-21
14. Interview with a representative from OLA, 2007-03-20
15. Interview with a forest company employee, 2007-03-20
16. Telephone interview with a representative from SSNC, 2007-04-02
17. Telephone interview with a district manager at the Forest Agency, 2007-04-03

**Other Interviews**

18. Interview with a forest company’s forest manager, 2003-06-10
19. Interview with a chairman of a MMU, 2003-09-10

**Participant observation at Wild Care Board Meetings**

County A 2007-06-01 0
County B 2007-05-21
APPENDIX 1

Variables in the MMU database

1. Name of MMU
2. Year of establishment
3. MMU year - year the plan was submitted
4. County
5. Area of MMU
6. Cultivated area
7. Number of hunting teams
8. Private ownership, municipality level
9. Public ownership, municipality level
10. Private ownership, MMU level
11. Public ownership, MMU level
12. Mix of private and public ownership, MMU level
13. Forest company ownership, municipality level
14. Yearly shooting number of moose and moose calves
15. Number of moose/1000 hectares – winter population
16. Percentage of bulls in the moose population
17. Percentage of cows in the moose population
18. Percentage of calves in the moose population
19. Goal as to the number of moose/1000 hectares – winter population
20. Change in the moose population – increase or decreased
21. Moose migration
22. Grazing damages
23. Amount of feed available
24. Local grazing inventory
25. Clearing of forest
26. Support feed of wildlife
27. Other wild care effort
28. Monitoring 1 Algbos
29. Monitoring 2 Helicopter inventory
30. Monitoring 3 Winter inventory
31. Monitoring 4 Calf inventory
32. Monitoring 5 Dropping inventory
33. Grazing damage on pine
34. Grazing damage on birch
35. Grazing damage on sallow
36. Grazing damage on aspen
37. Grazing damage on ash
APPENDIX 2

Results of the investigation of the two Counties.

<table>
<thead>
<tr>
<th>County</th>
<th>Adaptivity</th>
<th>Similarities</th>
<th>Differences</th>
</tr>
</thead>
</table>
| County B | Low level of activities (average 5)  
94% of MMUs consider the Grazing damages as significant  
The average number of too many moose is 3. | Number of MMUs 37  
Mixture of ownership structure (Company 20, private 6, mixture 2)  
The average time of existence of MMUs is 6.5 years  
50% of the total area of the county is constituted by MMUs | 1/5 of area is constituted by WMAs  
Total area: 2,2 million hectare  
Company owned percentage is 51%  
Mean area of MMUs: 35,000 hectare  
19 hunting districts and local forums |
| County A | High level of activities (average 10)  
34% of MMUs consider the Grazing damages as significant, and 52% as acceptable  
The average number of too many moose is 1. | Number of MMUs 28  
Mixture of ownership structure (Company 9, private 28)  
The average time of existence of MMUs is 5.5  
70% of the total area of the county is constituted by MMUs | 1/3 of area is constituted by WMAs  
Total area: 600,000 ha  
Company about: 30%  
Mean area of MMUs: 10,000 hectares  
8 hunting districts and local forums |
APPENDIX 3

Questionnaire regarding the County Moose Management

1. Title:.........................

2. How long have you worked with these types of questions? Since year?; .........................

3. Sex?......................

4. Age? ......................

5. What is your highest degree?.................................

6. How many positions are there, full-time- and/or part time, that work with hunting issues at your CAB?.................................

7. How large percentage of the total hunting grounds in your county is constituted by Moose management units, approximately?:.............

8. Do moose management units play an important role in the moose management, according to your opinion?

   No role today  Can come to fill an important role  Have today an important role

Comments:..........................................................................................................................
........................................................................................................................................
........................................................................................................................................

9. What do you consider of the quality of the MMU plans in general?

   Inadequate  Acceptable  Good

Comments:..........................................................................................................................
........................................................................................................................................

10. How often have you rejected or asked for revisions of MMU plans during the last five years in your county?

    Never  A few times per year  Several times per year

Comments:..........................................................................................................................

11. Has the quality of the MMU plans improved during the last five years?

    Yes  No
12. Have you ever deregistered a MMU?
   Yes, year .......   No

13. How many local forums are there in the county?..............

14. How often do the local forums convene?..............

15. What is your opinion of the functioning of the local forums in the county?
   Inadequate   Acceptable   Good

16. How is the cooperation among the actors involved in the moose management in the county? (Put a cross for each of the relationships)

<table>
<thead>
<tr>
<th></th>
<th>Inadequate</th>
<th>Acceptable</th>
<th>Good</th>
<th>Do not know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) SAHWM and the CAB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) CAB and the MMUs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) CAB and the FA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) SAHWM and NHA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) MMUs and local forums</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

17. Do you consider that the MMUs to a high degree are separated from other management organisations (CAB, local forums, and so on)?
   No, not true at all   Yes, to a certain extent   Yes, entirely

Comments:........................................................................................................
........................................................................................................
........................................................................................................
18. Do you consider that moose hunting issues are characterised by high levels of conflict, in general, in your county?

No, not at all  To some degree  Very

19. Has there been a change in the "level of conflict"?

Less  Unchanged  Higher

Comments:…………………………………………………………………………………………
……………………………………………………………………………………………………
……………………………………………………………………………………………………
…………………………………………………………………………………………………..

Finally, a question regarding dedicated persons;

20. Can you point out someone or some people that have been particularly dedicated in working towards the development of MMUs activities?

Yes  No

If yes, specify what type of actor for example, hunting consultant, chairman of a hunting district, and so on……………………………………………………………………
………………………………………………………………………………………………….
APPENDIX 4

Management Measures Index

The following variables make up the activity index. Each “activity” can be assigned a score of 0-1. The score range of the activity index is 0-20.

1. ÄlgObs (is used 1/is not used 0)
2. Helicopter (is used 1/is not used 0)
3. Winter inventory (is used 1/is not used 0)
4. Calf inventory (is used 1/is not used 0)
5. Dropping inventory (is used 1/is not used 0)
6. Local grazing damage inventory (is used 1/is not used 0)
7. Goal, number of moose per 1000 hectares (information exists 1/does not exist 0)
8. Number of Moose per 1000 hectares (information exists 1/does not exist 0)
9. The composition of the moose population (information exists 1/does not exist 0)
10. Changes in the moose population (information exists 1/does not exist 0)
11. Amount of grazing damages (information exists 1/does not exist 0)
12. Clearing of forest (is used 1/is not used 0)
13. Support feed of wildlife (is used 1/is not used 0)
14. Other wild care efforts (is used 1/is not used 0)
15. Grazing damage on pine (information exists 1/does not exist 0)
16. Grazing damage on birch (information exists 1/does not exist 0)
17. Grazing damage on sallow (information exists 1/does not exist 0)
18. Grazing damage on aspen (information exists 1/does not exist 0)
19. Grazing damage on ash (information exists 1/does not exist 0)
20. Amount of feed available (information exists 1/does not exist 0)
APPENDIX 5

Moose Inventory Methods utilized in Sweden

ÄlgObs
This inventory method is used across all of Sweden. It requires that hunters, during seven days of the hunting season, note down the number of moose they have spotted. At least 5000 hours is necessary for it to be accurate and, therefore, usually areas of 50,000 ha or larger are required due to the fact that larger areas have more hunters. During the LÄS project, it was revealed that local variants of the ÄlgObs had developed and that this, if not corrected, might lead to lower information value from this monitoring method (Wallin, Vikberg et al., 2003). The method is efficient at a regional level but not at a national level. It is not possible to compare different regions, since the likelihood of spotting moose differ due to differences in vegetation, topography and method of hunting. ÄlgObs provides information as to changes in the moose population by comparing the number of moose observations/man hour between years. The method also has proven to be a good measure of moose productivity, which is calculated by the number of calves divided by the number of cows. The probability that a change in the population, as measured by Älgobs, is a real change is 81% (Ericsson sammanfattning avhandling 1999/ Svensk jakt).

Airplane inventory
Airplane inventory is done by airplane or helicopter. The method is reliable regarding moose density and measures absolute densities. The disadvantage is that it is expensive and requires snow. This method usually is more reliable for larger areas as well. In the LÄS project, it was discovered that the fact that moose is migratory several times per year can lead to erroneous estimates of the moose population within areas (Wallin, Vikberg et al., 2003).

Dropping method
The dropping method gives a measure of moose density during a certain time period, for example, winter. It provides absolute data. The first step is to establish test areas where the number of droppings, in turn, are translated into the number of moose per 24-hour time period (the moose leave 14-17 droppings/24-hours). This measurement reveals moose density. The method can be inexpensive, but is labour intensive and demands many hours (SAHWM). When this method was encouraged in the LÄS project, it was discovered that the hunters had a tendency to overestimate moose density. The researchers suspected that this result stems from the fact that it is tempting for a hunter to report droppings, even if they are discovered outside the measured area, and that this inventory method is relatively sensitive to a single reporter's mistakes (Wallin, Vikberg et al., 2003).
The forestry manager at the forest company in Norrbotten County said that this method is not appropriate for the northern part of Sweden, due to its geographically large areas (interview 1).

**Shooting statistics**

Since 1939, the SAHWM has collected shooting statistics for moose. The system of shooting statistics is organized, based upon reports collected from geographically defined hunting areas. It functions well as a trend measurement, especially in areas where the same units report shooting statistics. Shooting statistics can be combined with other geographical information. The disadvantage is that there seldom is any information as to how representative the units are. The reports come from an area of approximately 33% of the total hunting area (Kindberg, 2002). All MMUs reported shooting statistics in the MMU management plans. Sometimes, the shooting statistics are unrefined, since many times it is a result of strategies by landowners to prevent increases in the moose population or actually to reduce the population (Lindroth, 2000).

**Åbin**

Åbin is an inventory method that measures grazing damage caused by cloven-hoofed animals. It is conducted by the National Board of Forestry (sw, skogsvårdsstyrelsen). The inventory method is used in areas of approximately 60,000 ha which are divided into squares that are measured for grazing damage ([www.svo.se/minskog/templates/grundbok.asp?id=10453UT](http://www.svo.se/minskog/templates/grundbok.asp?id=10453UT)). Local Åbin has been developed to measure grazing damage of moose on young forests, and has been developed to be utilized in areas of about 20,000 ha ([www.svo.se/minskog/templates/grundbok.asp?id](http://www.svo.se/minskog/templates/grundbok.asp?id)).