



Power in the Commons

The Politics of Water Management
Institutions in Sweden and Chile

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Institutions in Sweden and Chile**
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**Till min lilla Stockholmsfamilj,
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Preface

Water is the 'bloodstream' of both nature and society. It grows our crops, facilitates sanitation and drives critical processes in our life-supporting ecosystems (Falkenmark and Rockström 2004). At the same time, global environmental change is likely to entail increasing environmental variability and increased occurrence of extreme weather events. Wet areas are likely to become wetter, with more frequent episodes of flooding, whilst dry areas may become drier, with longer periods of drought. The implications should not be underestimated. In 2004, monsoon flooding had a devastating impact across the Nepal Terai, Northern India and much of Bangladesh. In Dhaka, 100 000 people were packed into shelters, and two thirds of Bangladesh was under water. In Nepal, over 5 000 families were displaced and thousands of hectares of land were washed away due to flooding and the construction of embankments in India. Deaths from flooding in Bihar exceeded 1 000. Prior years saw other disasters. The Orissa super cyclone in 1999 devastated coastal areas in South Asia. Over 1,8 million houses were affected and more than 10 000 people were killed (from Moench 2005). The complexity, uncertainty and (sometimes devastating) surprises that characterize our planet highlight the importance of issues and research questions that lie at the very heart of political science: how we organize society, do politics and - not the least - shape our institutions.

This thesis was originally inspired by the path breaking work of Elinor Ostrom in "Governing the Commons" (1990), and by what I identified as an interesting puzzle in the research field, that is the absence of theories that elaborated how asymmetries in social and economical power affect natural resource management. In a world where natural resource users of such diversity interact and cooperate in a variety of institutional and cultural settings - such as large hydroelectric companies, peasant farmers, sport fishers, indigenous communities, industrial agriculture, multinational corporations, small and large municipalities, upstream and downstream irrigators - this absence is troublesome for both theoretical and practical reasons. Theoretical because we as scientists fail to explain social phenomena that are obvious to all; and practical because our theories fail to guide the actions of social actors trying to cope with environmental and - in the end - social destruction.

The studies explore the utility of game theoretic models with empirical analyses of water management institutions in Chile and

Sweden. The comparison is interesting for several reasons. Chile experienced one of the most radical privatization reforms of the water sector in the 1980's hence putting the country's faith in solving water allocation and conflict in the hand of the market and the judicial system, while Sweden has chosen to maintain rigid governmental control on water management. The institutional setting thus varies considerably between the cases, hence allowing a more fine-grained analysis of the role that external institutions play in defining the distributional outcome of natural resource management institutions.

This thesis hence includes studies of how differences in social and economical power affects the creation and maintenance of institutions designed to manage commonly used natural resources, i.e. CPR-institutions. It uses some simple game-theoretic models to tease out under what circumstances these differences affect the distributional impacts of institutional choice, and how the interaction between heterogeneous natural resource users is structured by what I call external institutions. This last point is - as I intend to show - crucial for our understanding of distributional consequences of collective action in natural resource management.

Allow me to exemplify. Consider a case where a number of coastal communities are facing a steady decrease in fish stock due to human induced environmental change and over-fishing. The tricky part of the story is that these communities differ significantly in terms of social status and financial resources, the reason being that some of them sustain their livelihood through tourism rather than on traditional fishing (henceforth assumed to affect the actors *bargaining resources*). Add to this the impact of what I denote *external institutions*, that is a weak national environmental legislation and central agencies that lack both the incentives and financial resources to guide the activities undertaken by coastal communities. As will be extensively discussed in the following chapters, the kind of problems that arise for collective action in this setting have important implications for how to study the emergence and distributional impact of natural resource management institutions.

More precisely, I intend to show why asymmetries in bargaining resources among social actors' matters in solving problems related to the repeated prisoners' dilemma game in natural resource management. The thesis should therefore be of interest not only to scholars studying decentralized natural resource management institutions, or to the increasing body of neo-institutionalists, but also to those interested in how power relations are institutionalized in social systems.

Outline of the Book

The book is organized in the following manner. In chapter 1 I provide a brief introduction to the research area, and discuss why we should take distributional conflict and bargaining power seriously. Here I present a version of the game commonly known as the Battle of the Sexes game which I denote the “Battle of the Commons”.

In chapter 2, I specify my contribution further by highlighting existing research that deals with the impacts of social and economical heterogeneity on collective action in natural resource management. Here I also present a framework that - in comparison with earlier attempts - takes bargaining power seriously in the creation and maintenance of CPR-institutions.

Chapter 3 discusses some key assumptions in the forthcoming empirical analysis. Here I discuss the benefits and drawbacks of assuming a game theoretical approach to the analysis of power - probably one of the most controversial concepts in social theory.

Chapter 4 is a presentation of the research design and methodology to be used in the empirical analysis. In this chapter I discuss issues such as the case study selection, the application of game theoretical reasoning, and the material used.

The fifth chapter includes the first empirical case study from Sweden. Here I elaborate how differences in bargaining resources, external institutions and strategic interaction affect the outcome of existing and important water management CPR-institutions. Initial results from this chapter were published in the transdisciplinary journal *Ambio* and in a forthcoming book on networks, social capital and natural resource management (Galaz 2005a, b).

Chapter 6 assumes a similar analysis in Chile with a special emphasis on how water privatization and its external institutions such as the judicial system affects the distributional impacts of institutions designed to tackle water conflicts. Initial results from this study were published in *Environmental Politics* (Galaz 2004).

Chapter 7 concludes and summarizes the analysis in the preceding chapters, and points out a few interesting and remaining research issues, with a special emphasis on how to grasp the increasing complexity facing not only water management, but also neo-institutional theory.

Chapter 1.

Power in the Commons – Introduction

Marisol, an Argentinean woman with two children, chooses not to visit her friend's party that Saturday evening after her husband's threat not to give her the much-needed addition of household money that month if she does. Oscar, a 19 year-old political science student, does not voice his discontent with his professor's obviously biased description of the events behind the fall of the Berlin wall in 1989, knowing that his comment would diminish his chances to get a high grade on the course. The mayor of a city decides not to initiate a study on the unhealthy level of pollutants, correctly assuming that Metal Inc., the employer of 3,000 members of the community, might move its business elsewhere. A major film studio stops producing films containing violence and graphic language altogether, predicting that it might offend the Blockbuster "family store" policy, which might lead to a loss of 25 percent of video earnings before their project is even out of the gates.

That individuals, firms, governments and groups will alter their behavior out of fear of facing financial, physical, emotional or other kinds of punishments from another actor is part of social life. As individuals, we find ourselves constantly imbedded in relations with others, a circumstance that sometimes force us to act in ways that we would not do otherwise. This is a fact. We would therefore expect theories about human cooperation and collective action to take this fact into serious consideration. Unfortunately, they do that poorly.

The Argument

The main arguments elaborated in this thesis are two. First of all, I discuss how differences in social and economical power affects the creation and maintenance of institutions designed to manage commonly used natural resources. It is argued that previous studies far too often ignore the fact that the distributional outcomes of natural resource management institutions (often denoted CPR-institutions), is fundamentally affected by the capacity of actors to credibly commit to their preferred alternative.

Second, I elaborate how this credibility is structured not only by the concrete resources actors pose (i.e. economic and social resources), but also by what I denote “external institutions”. These institutions outside the direct control of natural resource users are claimed to have a fundamental impact as they are likely to define how actors evaluate their status quo outcome in case cooperation fails. As will be discussed extensively in the following chapters, both these aspects have received only limited attention from researchers to this date.

The example already presented in the foreword is a clear-cut example of the social processes I elaborate in this thesis. Consider again the coastal communities facing a steady decrease in fish stock due to human induced environmental change and over-fishing. While collective action has been argued to be difficult to achieve even in a simplified setting where actors have a common interest (Ostrom 1990), the thorny part of this story is that these communities differ significantly in terms of social status and financial resources. Simply put, while some of the communities sustain their livelihood through tourism, others are fully dependent of artisan fishing.

This setting by itself creates an interesting challenge for conventional theories of how actors overcome the “Tragedy of the Commons”. The reason for this is - put shortly as the issue will be elaborated in detail in the following chapters - that less dependent actors (in the example, the communities with alternative sources of income) might use this fact strategically to commit to their mostly preferred institutional solution. Though the argument has obvious parallels with the neo-realist argument in international politics (e.g. Mearsheimer 1994/5, Fearon 1998), the attempts to elaborate this dynamic for local natural resource management institutions such as CPR-institutions are few.

In addition, I argue that the impact of social and economic heterogeneity is far from deterministic. Instead, I argue that the credible commitment of actors is fundamentally affected by what I denote *external institutions*. In the example discussed above, aspects such as national environmental legislation, the strategies assumed by central agencies, existing problems of policy-enforcement etc. all define these external institutions that in the end might benefit any of the two coalitions of actors. As will be extensively discussed in the following chapters, the kind of problems that arise for the possibilities of collective action in this setting, has important implications for how to study the emergence and distributional impact of natural resource management institutions.

Outline of the Chapter

In this opening chapter, I present the theoretical foundations of a growing research field dealing with human cooperation, social institutions and natural resource management. This chapter begins with a general presentation of the classical work of rational choice scholars such as Elinor Ostrom. I then point out some of the drawbacks from this research field with an implicit focus on distributional consequences of cooperation. I then present an alternative game theoretical model - here denoted the "Battle of the Commons" - that puts considerably more importance of issues such as distributional conflict, credible commitments and reputation. The chapter ends with a discussion of how these two approaches differ, but also interrelate to each other both empirically and theoretically.

I. RATIONAL CHOICE INSTITUTIONALISM AND THE COMMONS

The empirical focus of this thesis is on institutions created to manage common pool resources, often called "common property regimes" or "CPR-institutions". These are collective action rules created to deal with the destructive use of resources such as forests, irrigation systems, fisheries, groundwater basins, grazing lands, and the air we breathe. But my interest is also theoretical. The study of common property institutions is explicitly a study of institutional emergence and change. It is also a research field that has made substantial progress towards understanding the micro-foundations of human cooperation by combining formal theory, laboratory experiments, and field extensive research (e.g. Ostrom et. al. 1994, Ostrom et. al. 2002, Ostrom 2005).

The theoretical foundation of the field has its origin in Garret Hardin's classical article "The Tragedy of the Commons" from 1968. The article describes a situation in which a number of herdsmen graze their herds on a common pasturage. Each herdsman is aware that it is to his benefit to increase the size of his herd because, while each of his animals represents potential profit to him, the cost of grazing the animal, measured as the damage done to the common pasturage, is shared by all of the herdsmen. The result of the herdsmen's rational individual choices, each trying to maximize their own benefit, makes the quality of the commons deteriorate. Another classical and widely used example of the tension between individual and collective rationality is the "prisoners' dilemma" game.

The game received its name from the following hypothetical situation: imagine two criminals arrested under the suspicion of having committed a crime together. However, the police do not have the proof required to have them convicted. The prisoners are secluded from each other, and are offered a deal: the one who offers evidence against the other one will be freed. If none of them accepts the offer, they are in fact cooperating against the police, and both of them will get only a small punishment because of lack of proof. If one of them betrays the other one by confessing to the police, however, the defector will gain more, since he is freed. The one who remained silent, on the other hand, will receive the full punishment, since he did not help the police, and there is sufficient proof. If both betray, both will be punished, but less severely than if they had refused to talk.

The dilemma emerges from the fact that each prisoner has a choice between only two options, but cannot make a good decision without knowing what the other one will do. In the end however, each prisoner has a strong incentive to betray his partner. The reason for this is that each prisoner is better off choosing to betray, no matter what the other prisoner chooses. Though both prisoners are better off cooperating with each other and remain silent, the prediction following from this game is that they will betray each other.

This game has been used to illustrate the problem of cooperation in research fields as diverse as political philosophy, international politics, political economy, problems of collective action and the creation of public goods (Tsebelis 1990:62). In short, the game has been used to capture the dynamics of any problem that seems to include a conflict between individual and collective rationality.

Governing the Commons

Is there any way out of this dilemma? Historically, social scientists have focused on the impossibility of getting self-interested actors to cooperate. Recommendations have thus been based exclusively on external solutions such as central intervention (Leviathan), or privatization of the resource to solve the commons dilemma.

These recommendations change fundamentally in 1990. In her seminal work *Governing the Commons*, Elinor Ostrom analyzes a remarkable number of cases when the involved actors actually have avoided the tragedy through the voluntary creation of institutions - contrary to the claim of Hardin and other social scientists. That is, the players have themselves been able to change the structure of the game and reach a cooperative outcome. Ostrom also tries to find the factors that might affect the actors' incentives to cooperate and retain the resources' productivity and sustainability. As she clearly demonstrates, this result has deep implications for how we look at policy

recommendations to solve the commons problem. The question is no longer whether privatization or government procurement of commonly owned natural resources is the solution, but rather how to design policies that enables the users themselves to successfully develop and maintain effective institutions.

Governing the Commons has rightfully inspired many and led to the emergence of interdisciplinary research explicitly focusing on the connection between the commons dilemma and natural resource management. *Governing the Commons* is also one of the most quoted books in political science today. This is not surprising; the book is more than a discussion on why users cooperate to sustainably manage natural resources, but also an analysis of the emergence of human cooperation and the mechanism behind the creation of institutions under which people rule themselves. The books *Rules, Games and Common-Pool Resources* (1994) written by scholars from Indiana University, and *The Drama of the Commons* (2002) are excellent examples of how formal theory, experimental data and extensive field research can be combined to understand both the importance, and emergence of decentralized natural resource management institutions.

II. THE BATTLE OF THE COMMONS

Studying how natural resource users overcome the dilemma has become an ever growing research field, including interesting contributions from various research disciplines. The analysis of how actors surmount the “Tragedy of the Commons” hence seems to have sparked off new research issues and inspired many researchers. As I intend to show, however, the often quoted solution presented to the well-known prisoners’ dilemma game veils the fact that there exist several asymmetric equilibria (i.e. solutions) to this game. That is, there is no guarantee that CPR-institutions are not designed intentionally to systematically benefit one player at the expense of the other. The solution could thus be at the expense of the player with the weakest bargaining position. The implication of the argument is not unimportant in a world where CPR-institutions often are the result of the interaction between wealthy and poor, or with parties imbedded in gender inequalities.

The Prisoners’ Dilemma Revisited

Let us return to the Prisoners’ Dilemma. The game is often presented as a game played once, with one so called “suboptimal equilibrium” where both players defect. It is denoted “suboptimal” because the outcome does not reflect the optimal outcome where both receive only a mild punishment. And it is termed “equilibrium” because

the outcome has the property that no player can benefit by changing her strategy while the other player/s keep their strategies unchanged (the more correct term is “Nash Equilibrium” after Nobel Laureate and mathematician John Nash, and is probably the most widely used solution concept in game theory).

This outcome however, is only valid if the game is played only once. A more realistic presentation, and the assumption that is made in Ostrom (1990) is to focus on the fact that this game is played repeatedly (c.f. Ostrom 1998a,b). According to the well-known Folk Theorem, a (infinitely, or finite but indefinite number of times) repeated prisoners’ dilemma game might in fact lead to mutual cooperation as the equilibrium outcome. Put shortly, cooperation is sustainable if there is a high probability that interactions will be repeated, players are able to identify and punish defectors, the expected gains from cooperation are positive, rewards from defection are not too high, and players do not discount future pay offs too heavily (see Kreps 1990:505ff, Seabright 1993:118ff for details). Axelrod’s now classical *The Evolution of Cooperation* (1984) is an excellent description of how cooperation can emerge through the use of trigger strategies such as Tit-for-Tat. The simplest version of this strategy has only two rules. On the first move co-operate, and on each succeeding move do what your opponent did in the previous move. It has three characteristics: It is nice (cooperates on the first move), retaliatory (punishes defection in the prior move with defection) and forgiving (immediate return to cooperation after one C of the adversary). Thus, Tit-for-Tat is a strategy of co-operation based on reciprocity (Brems 1996). This is nothing new to rational-choice scholars, and the field has made extensive progress, both theoretically and empirically (c.f. Axelrod 1997).

What is interesting here is the fact that there are many Nash-equilibria for this repeated prisoners’ dilemma game. Roughly, “any pair of payoffs that is feasible and gives each player more than zero apiece [i.e. the punishment payoff] can be sustained in an equilibrium” (Kreps 1990:507). According to Friedman’s Theorem (1971), any of the points in the crosshatched region (BDEFB) in Figure 1.1. can be achieved as the average payoff in a sub-game perfect Nash-equilibrium of the repeated game (Gibbons 1992:98f).¹

An interesting observation is that the points (x, y) - that is the payoffs to player 1 and 2 - very seldom lead to a distribution that is equal. More precisely, the distribution is equal *if and only if* the final settlement is on the line between the points B and E. In most of the

¹ This is true provided that the discount factor is sufficiently close to 1. F and D denote two points in the graph used to divide the area between the points BDEFB in the graph.

agreement that guarantees *their* key industries unlimited amounts of water during the dry months of the year at the expense of city A, or an agreement that *includes* jointly implemented rules to cut down on environmental pollutants leaking into the aquifer. That is, not only do the players have to coordinate their actions to achieve an agreement, but they differ on which of the agreements to choose due to its differing distributional consequences. This might provide a serious obstacle for collective action (Raiffa 1982, Miller 1992:36-57).

What if the players have unequal stakes at risk in a possible breakdown of negotiations? Or if they differ in other ways that systematically gives a type of player a distributional advantage in the creation of rules of extraction? This is the subject of the following sections.

The Battle of the Commons

The repeated prisoner's dilemma game can therefore very easily turn into what I would like to call a "Battle of the Commons Game", where the herders not only must coordinate, but also must choose between different equilibrium solutions (i.e. CPR-institutions) with different distributional outcomes. In other words, even if the herders are aware of the fact that creating new CPR-institutions to manage natural resources might help them to overcome the commons dilemma, they would still disagree on where to coordinate due to the fact that the new institutions have different distributional consequences.

Again, the fact that cooperation is possible without a contract is nothing new to game theorists. The point here is to highlight the fact that the symmetry suggested by the archetypical two-by-two prisoners' dilemma matrix - with only one cooperative outcome where the benefits of this outcome are divided equally (e.g. Ostrom 1990:15ff) - involves a rather significant, and bold assumption. Real-world constellations will often allow for several "cooperative" solutions that may differ significantly in their distributive consequences, which makes the standard model of the origins of institutional emergence flawed (c.f. Scharpf 1997, Snidal 1985).

What is essential in this context is that any attempt to explain the emergence of CPR-institutions, and hence human cooperation, must include a specification of the choice social actors' make among institutional alternatives with different distributional consequences.²

² Note that the problem of multiple asymmetric equilibria is an issue even with a pair or more actors *that are homogenous* in terms of payoffs in the one-shot game (Cabral 1988, c.f. Calvert 1989), and not a problem exclusively for interaction between heterogeneous actors as some incorrectly assume (e.g. Korpi 2001).

This is also the linkage between the abstract game theoretical models and the empirical analysis to be assumed in this thesis. That is, even though there are no determinate ways to *a priori* select among competing Nash-equilibria (described in Figure 1.1.), empirically people do of course find or create such solutions through the use of “focal points” (Schelling 1960, Schiemann 2000, to be defined in the following chapters), which implies one thing. Theories aiming to specify the creation of these “focal points” should be based on empirical analysis, rather than merely theoretical explorations. The empirical analysis in the following chapters intends to contribute to such an increased understanding.

Analyzing Cooperation and Distributional Conflict

The difference conflicting distributional outcomes makes for the possibilities of cooperation has nonetheless received attention from scholars of political institutions, mainly in international politics.

As an example, Fearon (1998) argues that before states can cooperate and enforce an agreement, they must bargain to decide which one to implement due to distributional issues. International cooperation hence can include both a bargaining problem, and an enforcement problem as a result of the various forms international cooperation can be formalized. One important implication from this analysis is not only that though a “long shadow of the future” might make enforcing an agreement easier, it might also give states an incentive to bargain harder, hence making cooperation more difficult to achieve.

Frank Alcock’s analysis of property rights in fisheries (Alcock 2002) notes that there are an infinite number of possible distributive outcomes along the Pareto frontier. Hence arguing that actors create institutions in an effort to move from status quo situations to the Pareto frontier begs the question of trajectory as possible agreements differ in their distributional consequences (see also Keohane 2001, Knight 1992, Krasner 1991, Heckathorn and Maser 1987). Though the analysis is based on examples from international and comparative politics, I see no reason why it can not be applied on regional or local CPR-institutions such as those described in Ostrom (1990).

Taking Credibility, Reputation and Breakdown Values Seriously

A different description of the commons dilemma in which the users interact repeatedly is hence a game that captures the dynamics of both coordination and conflict. Though there are several approaches to analyze conflict (see Lewicki, Weiss and Lewin 1992:211ff),

noncooperative game theory seems well fit to characterize the setting and bargaining process potentially inherent in the emergence of institutions.

Figure 1.2. A Simple Battle of the Commons Game

		Player 2	
		A'	A
Player 1	A	0	1
	A'	2	*
		0	0
		A'	A

Comment. The game theoretic model illustrates a Battle-of-the-Sexes Game reformulated as a Battle-of-the-Commons Game. The actors have two options, 'A' or 'A''. Symbols represent the pay-offs. "*" represents a Nash-equilibrium.

Once we introduce a game characterized by both cooperation and conflict, aspects such as *credibility* and *reputation* become fundamental. Consider a simple example involving two players trying to reach a common agreement (Figure 1.2). Though the game described here is a one-shot game, the intention is to put the distributional issue that follows from a repeated Prisoners' Dilemma game at the centre of analysis. This agreement can only be achieved if the players manage to coordinate on one of the two possible agreements (A',A'), i.e. institutional A', or (A,A) i.e. institutional solution A. If they fail to agree, both players receive the pay-off zero.

One interesting feature of this game is that the two possible agreements have different distributional consequences for the players. While the agreement (A', A') gives the payoff 1 to Player 1, and 2 to player 2, the opposite applies to alternative agreement (A,A). That is, not only do the players have to coordinate their actions to achieve an agreement, but they differ on which of the agreements to choose due to its differing distributional consequences. As mentioned earlier, this is a crucial difference compared to the often used Prisoners' Dilemma game.

As an example, consider two water users A and B trying to coordinate their use of a common lake. While both agree on the fact that common institutions defining rules of use are to prefer to the

existing “open access” situation, they differ on which agreement to reach. That is, while city A prefers an agreement that includes the conservation and active management of fish population, user B might prefer another agreement. That is, an agreement that is devoid of any conservation component and instead secures the use of the lake as a solvent of pollutants from agricultural activities.

What if the players have unequal stakes at risk in a possible breakdown of negotiations? Or if they differ in other ways that systematically gives a type of player a distributional advantage in the game? Let us complicate this game further to capture the kind of issues resulting from these questions. Knight (1992, 1995) describes such a game presented in Figure 1.3.

Figure 1.3. Battle of the Commons Game

		Player 2	
		A'	A
Player 1	A	Δ_1 Δ_2	x $x + \epsilon_2$ *
	A'	$x + \epsilon_1$ *	Δ_1 Δ_2

Comment. The game theoretic model illustrates a Battle-of-the-Sexes Game reformulated as a Battle-of-the-Commons Game. The actors have two options, 'A' or 'A''. Symbols represent the pay-offs. “*” represents a Nash-equilibrium.

Just like the simpler game described earlier, this game belongs to a class of games of coordination with conflict over distribution. The players have a common interest in coordinating their choices so that one of the outcomes (A',A' or A,A) is reached, but Player 1 would prefer the first option (A',A') and Player 2 the second (A,A). ϵ_1 and ϵ_2 represents the distributional advantage accruing to one of the actors if a particular alternative (A or A') is chosen. The main goal for the actors in the game is assumed to be to gain as high payoff as possible, that is, not only to achieve cooperation (AA, A'A') but also to achieve the additional ϵ_1 (for Player 1) or ϵ_2 (Player 2). The preference relation is thus assumed to be:

Player 1: $x + \epsilon_1 \succ x \succ \Delta_1$
 Player 2: $x + \epsilon_2 \succ x \succ \Delta_2$

Δ_1 and Δ_2 represents the payoffs that the actors will receive if they fail to achieve an agreement. These payoffs are also called breakdown values. *Note that each player has its own breakdown value* (Player 1 has Δ_1 , and Player 2 has Δ_2). The important question at this point is which of these equilibria that will be chosen.

The solution lies in what usually is called the *credibility of strategic commitment* (Knight 1992:128ff, Scharpf 1997:74f, Elster 1989:69ff, Heckathorn and Maser 1987, Powell 2002). The logic is the following: if Player 1 can credibly commit to play A' in a repeated game, the rational action for Player 2 will be to follow the rule and agree to A'. Although Player 2 may prefer the other alternative, the knowledge that Player 1 will play A' despite of what Player 2 does constrains his/her choice of playing A. More generally, if the alternative that Player 1 prefers - that is A' - is to be self-enforcing, s/he must find a way to commit to the A' strategy in repeated plays of the game. If Player 1 can make this commitment credible, the rational action for Player 2 will be to follow the rule and play A'. But what makes the commitment of the Player 1 credible?

Credibility is, with the presented model in mind, defined by two aspects: the players *bargaining resources* and *reputation*. The bargaining resources are, simply put, defined by the actors break down values (Δ_1 and Δ_2). The differences in these values determine one other important bargaining characteristic: the users' risk-aversity. The argument is that a player that who has less to lose from a breakdown, is more likely to risk one (Knight 1992:133f, Knight 1995). More precisely, actors with a relatively high breakdown value can credibly claim the following: "If you don't accept my alternative, I'll make sure our negotiations breaks down. As we both know, I don't have as much to lose compared to you."

The claim "as we both know..." is crucial here and highlights the fact that a commitment to be credible requires common knowledge. Reputation is therefore a key in understanding the outcome of distributional conflict (c.f. Gächter and Falk 2002, Kreps 1990:532ff). The reason for this is that previous experiences provide actors with information on the capability of the other player to commit to a certain strategy. Without this information, there is no way to estimate whether strategic commitments - independently from the objective bargaining resources that the players possess - are credible or not. How this important information is made available through repeated interactions is described in the next chapter.

III. THEORIES OF INSTITUTIONAL EMERGENCE AND CHANGE

What equilibrium is most likely to be chosen? Or put differently, which particular equilibrium will be focal to the players, and to the benefit of whom? Roughly put, there exist two main rational choice based approaches to explain institutional emergence and change (e.g. Weimer 1997, Tsebelis 1990:92-118, Heckathorn and Maser 1987, Korpi 2001, Knight 1992). The first approach rests on the idea that institutional changes occur as resulting from the realization of opportunities for changes in rules that are Pareto improving (e.g. Eggertson 1990, Ostrom 1990:192ff, 1998). This observation rests on the importance that institutions have in our life. Without institutions - such as property rights, laws and political institutions - the countless number of interactions that are a fundamental part of social life would be almost impossible. Cooperation, and thus the emergence of institutions, will be the result of actors' will to achieve collective benefits.

The distributional theory on the other hand, explains institutional emergence and change as the byproduct of distributional conflicts among interests seeking distributional gains. This is also the main ingredient in the model presented earlier. Bargaining among interested parties establishes rules that have distributional consequences and thus the rules reflect asymmetries in bargaining power among the participants. Institutional change can result from a change in either the interests or the resources of the actors (Knight 1992, 1995, c.f. Korpi 2001, Tsebelis 1990:92ff).

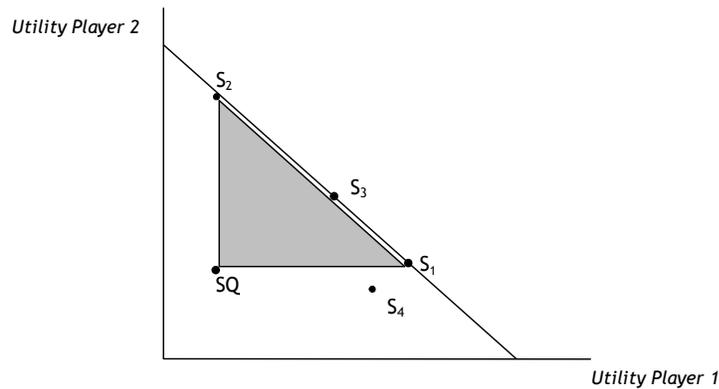
The question that remains to be answered seems to be which of these two approaches that best capture the complexity of social interactions. As will be shown, there is no simple answer to this question. The reasons to be elaborated further below, are three: 1) the theories are not mutually exclusive, 2) theoretical elaborations of the impact of economic heterogeneity (i.e. bargaining resources) on collective action and how actors choose between the numerous possible asymmetric equilibria is unclear, 3) and so is the empirical evidence from studying the impacts of economic heterogeneity.

The Case of Overlapping Theories

It might seem like an uncomplicated task to construct a simple empirical test of these two seemingly competing theories (e.g. King et. al. 1994:19ff). Unfortunately, it isn't. One reason for this is that institutional emergence and change many times can be both Pareto-improving and result in a distributional advantage to one of the players

(Knight and North 1997:351, c.f. Tsebelis 1990:104f). The next figure illustrates the point.

Figure 1.4. Dividing the Benefits of Cooperation



Comment: The figure shows two players in search of changing the status quo (SQ). Player 1 prefers $S_1 \succ S_4 \succ S_3 \succ S_2$, and Player 2 prefers $S_2 \succ S_3 \succ S_1 \succ S_4$ (c.f. Tsebelis 1990:105).

If the point SQ represents the status quo, any move to a point within the shaded area represents an improvement in utility for both players (henceforth “efficient institutions”). The opposite applies to the non-shaded area where any move from the status quo must be at the expense of the other player (“redistributive” institutions).

However, it is important to note that a move to - just as an example - the point S_3 is both a Pareto-improvement and results in distributional impacts to the benefit of Player 1. The fact that the same outcome can be described by both theories thus makes a simple test of the theories inappropriate. But what if the players move from SQ to S_4 ? Shouldn't that imply that the distributional theory is superior in explaining the outcome? The answer is no.

Another problem with conducting a simple “test” of the theories has to do with that decisions often are made under uncertainty. In the process of deciding which form of an institution that will maximize their own interest, social actors rely on their beliefs about the benefits that will be produced by the various institutional forms. But they will often be disappointed as the causal theories they use to assess the consequences of social institutions will often be wrong. This makes it unfeasible to derive results just by looking at the final design of the institutions, which complicates our efforts considerably (Knight and North 1997).

As theorists have made very clear, the interesting research task is thus not to “test” the correctness of both theories, but rather to specify the mechanisms that the theories identify as the driving force for institutional emergence and change, and to “focus on the sets of conditions under which either the economic or the distributional theory does the best job of explaining change” (Knight and North 1991:351).

Summing Up

The solution of the repeated prisoners’ dilemma game evidently often leads to both coordination and distributional issues. And more often than not, to games with a multiplicity of equilibria. Ironically for rational choice theory, players’ “rational” responses to strategic uncertainty must be sensitive to such hard-formalized aspects as their prior *beliefs* about how other players will respond. It is however difficult to specify these priors precisely with any confidence (Crawford and Haller 1990:573, Romp 1997:266). An equilibrium is thus focal not because of some easily defined objective criteria, but because the players have come to *believe* that others will play consistent to this equilibrium. Hence it becomes “rational” for each player to expect that all other players will play consistent with this equilibrium, and to act on that expectation (c.f. Schelling 1960, Peyton Young 1998). This is exactly the case with the Battle of the Commons game described earlier.

Part of the solution to the multiple equilibria problem - at least if we want to use these models empirically - lies in the subjective expectations of social actors. Past “history of play” may thus act as a mechanism that enables them to coordinate in selecting between the multiplicities of potential equilibria to which we know repeated interactions give rise. It is this retrospection that forms strategic expectations; it is experiences from past interactions that guide the evolution of institutions (Kreps 1990b:772). As will be shown, both theory and empirical studies of the emergence and change of CPR-institutions deal with these aspects rather sparsely.

Chapter 2.

Just Another Case Study?

The fact that social actors are able to cooperate and overcome destructive free-riding in natural resource management has received an increasing attention from scholars the last decades. However, as I have argued, the fact that cooperation imbeds distributional consequences remains an underdeveloped issue.

In this second chapter, I discuss the present state of theory development in the field with a special emphasis on how collective action is affected by social and economical heterogeneity. I also discuss and elaborate the often important - yet systematically ignored - role that external institutions play for the distributional outcome of natural resource management cooperation. I end this chapter by presenting a re-modified framework for studying institutional emergence and change in the commons.

I. THORNY U-SHAPES - THE AMBIGUOUS IMPACT OF ECONOMIC INEQUALITY ON COLLECTIVE ACTION

Social actors can differ along a diversity of dimensions including social class, ethnicity, gender, assets and interests (e.g. Bardhan and Dayton-Johnson 2002:88f). For simplicity, and in accordance with the bargaining model to be used in the empirical studies, here I will only focus on the theoretical and empirical debate regarding the link between economic inequalities (c.f. the players breakdown values) and the distributional consequences of collective action in the commons. As will be shown, the relationship is far from being as simple as it has been claimed.

Theory

There is little agreement about the effects of heterogeneity on actors' cooperative behavior. Broadly, theoretical research tends to diverge into three camps: those that find a positive role for heterogeneity, those that point out a negative role, and those in between. In his seminal work Olson (1965) argues that the greater the interest in the collective good of any single member, the greater the

likelihood that this 'large' member will get such a significant proportion of the total benefit from the collective good that s/he will gain from seeing that the good is provided, even if s/he has to pay all of the cost himself. Hence the emergence of cooperation will be to the benefit of the 'small' at the expense of the 'large'. As several theorists have shown, however, the case of heterogeneity covers a wide variety of different collective action situations that need to be carefully specified.

As Baland and Plattau show there is no reason to assume that the richer party will cooperate on all times (Baland and Plattau 1996:84f). On the contrary, the fact that one of the players is "richer" gives him/her the ability to "commit himself to a particular plan of action and to signal it in an unambiguous way to the weaker party", which gives him/her a distributional advantage (Baland and Plattau 1996:85). Boyce (1988) on the other hand, argues that inequality can deter cooperation altogether. The reason for this is that inequality may increase the scope for a powerful minority to impose rules of the game that benefit them, at the expense of the large majority in the community. Anticipating opportunistic behavior from the powerful minority, the weak would refuse to cooperate with them.

To complicate things further, some theoretical studies point at a U-shaped relationship between collective action and heterogeneity of assets (Bardhan and Dayton-Johnson 2002, Baker 1998). The argument is that while too much disparity in wealth distribution reduces a commons interest in reaching an agreement, some wealth inequality provides incentives for certain individuals in the community to bear a disproportionate share of the costs associated with organizing collective action.

Who Is Right? An Empirical Assessment

There are a large number of case studies analyzing the impact of economic heterogeneity on collective action. Easter and Palasami show that the smaller the variation in farm size among farmers in Tamil Nadu (India), the more likely that water user associations will form (as quoted in Bardhan and Dayton-Johnson 2002:93). A review of large n-studies in India, Central Mexico, the Philippines, North Pakistan and Nepal made by Bardhan and Dayton-Johnson (2002) shows that both social and economic heterogeneity has a negative impact on cooperation in the commons. Jodha (1986), on the other hand, has collected evidence that shows that the design of rules to manage forest resources have been designed to the benefit of the poor more than the wealthy in the majority of the communities surveyed.

Dayton-Johnson (2000) shows in a study including 48 Mexican farmer-managed irrigation systems how wealthier landholders

successfully press for larger shares of the irrigation supply. Furushima Toshio shows how the rights to common access to land were usually distributed unequally in Japan, on the basis of individual holdings of animals or cultivated fields (as quoted in McKean 1992:262). Ashok Rudra's study in Indian villages has also shown how class division and the distribution of wealth seriously affected the creation of efficient economic institutions (Rudra 1984 as quoted in Gustafsson 1991:22f).

José Molinas' study of 104 local peasant committees in Paraguay finds that a moderate level of inequality is associated with higher levels of committee performance, but that high levels of inequality make it more difficult for committees to operate effectively (Molinas 1998: 419-421). Varughese and Ostrom (2001), on the other hand, argue in their study of 18 forest user groups in Nepal that economic heterogeneity does not have a determinant impact on the likelihood or success of collective action.

Empirical results from the field are thus highly ambiguous. Part of this could probably be explained by the fact that field studies so far have been far from able to isolate the plentiful possible intervening variables, which makes a comparison between homogeneous cases impossible (c.f. King et. al. 1994). Experiments made by social psychologists and experiments dealing with related issues might at best give us important insights into the causal relation between heterogeneity and collective action.

Experimental Results

Mannix (1991) shows in experiments where people draw on a common resource those groups with power imbalances - that is groups with different profit percentages - made a less efficient, and a more discriminatory use of available resources. However, asymmetric members playing a "resource dilemma" - where the subjects learned that they could take points from a certain source and that they could obtain a bonus if they would leave more than 120 points in this source - tend to coordinate choice behavior in a way that minimizes differences in final outcomes (van Dijk and Wilke 1995. c.f. Wit et. al. 1992, Frohlich and Oppenheimer 1992). Behavior in bargaining experiments, such as the "ultimatum" and the "dictator game", also seems to depend crucially on the experimental environment, i.e. the framing of instructions and the incentive level. Observed behavior shifted towards the prediction of noncooperative game theory - that is a more unequal distribution of collective benefits - as the rewards got higher (Sonnegård 1996:360. C.f. Kreps 1991b:565-8, Roth 1995:328f).

There seems to be no definite results of whether, or under what circumstances wealthier actors will exploit their bargaining advantage

in the search for collective gains. What we do know, however, is that this process is seriously affected by how the game is structured.

II. JUST ANOTHER CASE STUDY? - SHORTCOMINGS OF EARLIER RESEARCH

The number of case studies and laboratory experiments focusing on issues very similar to those discussed in the introduction of the chapter is remarkable. Yet the results are still very inconclusive. Do we need yet another case study to pile up on the rest of the others? As I argue in this section, my contribution to the research field rests on three problems with previous research, all having to do with difficulties in assessing the causality between social and economical heterogeneity and collective action.

First, the fact that humans are bounded rational and make decisions under uncertainty makes it hard, if not practically impossible, to derive results of the mechanism just by looking at the final design of institutions. As already mentioned, social actors often rely on their often incorrect beliefs about the benefits that will be produced by the various institutional forms (see Immergut 2002 for an example). The fact that we observe an existing or non-existing relationship between economic inequality (independent variable) and the discriminatory design of CPR-institutions (dependent variable) - regardless of whether it is statistical (e.g. Bardhan and Dayton-Johnson 2002, Molinas 1998, Dayton-Johnson 2000, Varughese and Ostrom 2001) or found in case studies (e.g. Ostrom 1990, Burger et. al. 2001) - is not enough to straighten out the correlation as the value of our dependent variable could be the result of unintended consequences of institutional emergence and design (see chapter 1).

Second, the solution of the repeated prisoners' dilemma game is as discussed exceedingly based on the actors' mutual *expectations* and *credibility*. That is, the equilibrium choice to the repeated prisoners' dilemma game relies heavily on the expectations of the future actions of strategic actors. Aspects like *expectations* and *credibility* are hardly captured in large n-studies that base their logic on a simple definition of the independent variable - such as economic heterogeneity measured as differences in landholding among farmers (Molinas 1998), or differences in possession of land, livestock etc. (Varughese and Ostrom 2001:754f).

This important point has been elaborated game theoretically. Baland and Plattau (1996:84-89) discuss some possible games of collective action between a "poor" and a "rich" player. The equilibrium outcome of the interaction is different for each game, despite the fact that the players are identical, and the collective action problems are similar. The impact of economic inequality on

collective action - regardless of how it is measured - *is thus highly dependent on the precise structure of the game* being played, and the possible pay-offs. This might explain the ambiguous results of experimental psychology and economics presented earlier. The players and their bargaining resources might hence be identical, but the “action situations” (c.f. Ostrom 1999:498, Ostrom 2005) or “actor constellation” (Scharpf 1997:44f) differ substantially.

This might be viewed as a small - though I would argue not unimportant - problem if large n-studies are conducted within an almost identical setting (such as a region or country, e.g. Varughese and Ostrom 2001, Molinas 1998, Cardenas et. al. 2002), but is probably much more serious in studies that base their results on cross-country comparisons (e.g. Bardhan and Dayton-Johnson 2002, Ostrom 1990). Hence the fact that *credibility* is highly context dependent might be one of the reasons why the results have been so indefinite.

Third, the nowadays common statement that the relationship between economic inequality and collective action is U-shaped is an interesting starting point and highlights the danger of defining a too simplistic relationship. On the other hand, this account is far from being precise enough to apply empirically. In other words, we are far from being able to predict which of the processes described earlier that will dominate the design of institutions. Hence a lot remains to be done, both theoretically and empirically, before we can surely assess under what circumstances economically heterogeneous actors will create efficient or distributive institutions.

What's New? Allowing External Institutions to Matter

In solving game theoretic models we seek to find equilibrium outcomes. In the case of multiple equilibria, no clear predictions of the outcome are possible (Kreps 1991:95ff, Morton 1999:182). This fact seriously limits the predictive and explanatory power of game theory in the study of institutional emergence and change.

As discussed earlier, the “history of play” may act as a selection mechanism, which enables actors to coordinate in choosing between the multiplicities of potential equilibria to which we know repeated interactions give rise. As I hope to have shown above, *none of the studies referred to earlier takes this well-known fact under serious consideration in the design of their studies.*

However, not only are we interested in how these expectations matter, but we should also to be interested in trying to define under what circumstances these aspects have an impact on whether the process results in efficient, or redistributive institutions. As I argue in this section one fundamental aspect that has been ignored so far - and to spell it out clearly, the true novel aspect of the thesis - is how the

distributive struggle in the creation of new common pool resource institutions is molded by not only differences in bargaining resources, but also by what I call “external institutions”.

Why Should Institutions Matter?

Strategic decisions made by social actors are never made freely from a context, or games in other arenas (c.f. Tsebelis 1990, Sened 1997). The creation of common pool resource institutions is obviously no exception. This “context” seriously affects the degrees of freedom available to actors in their attempts to maximize their share of cooperative gains. Hence decisions beyond the scope of the actors seriously modify the payoff matrix of the game, and may at worst create circumstances that give some players a bargaining advantage that *supports* the creation of redistributive institutions to efficient ones. Previous studies do not recognize the important role of what I would like to call “external institutions” (c.f. Scharpf’s “Institutional Setting”, 1997:47ff, see the following sections for further specification) play in structuring the interaction between social actors. More precisely, *external institutions have never been allowed to matter* in the research design of key studies such as (Varughese and Ostrom 2001), (Bardhan and Dayton-Johnson 2002), (Dayton-Johnson 2000) and (Molinas 1998).

The implications are far from unimportant. If external institutions seriously define key aspects of the Battle of the Commons game and hence the outcome, *this would explain why we observe that economic heterogeneity matters in some cases, but not in others*. To be more precise, this might be the reason why redistributive CPR-institutions are observed in parts of Mexico but not in India, in Chile and Japan but not in Colombia, and why results from large-n cross-country comparisons have been inconclusive.

Allow me to illustrate this vague statement with results from one of the analytical case studies to be included in the thesis. In 1981 the Chilean military government dictated a new Water Code that completely transformed the country’s system of water rights, and created the necessary elements for a free water market: it strengthened private property, introduced market mechanisms and incentives, and considerably limited the state’s power to regulate. At the same time, it intentionally delegated the resolution of water conflicts to private negotiations, to the different water user associations and to the judicial system. As the result of a compromise between the military regime and strong farmers’ associations, it also introduced a paragraph in the new Water Code that gave water users in water user associations (i.e. CPR-institutions) one vote per water right, and not per user. This, together with the fact that conflict resolution in

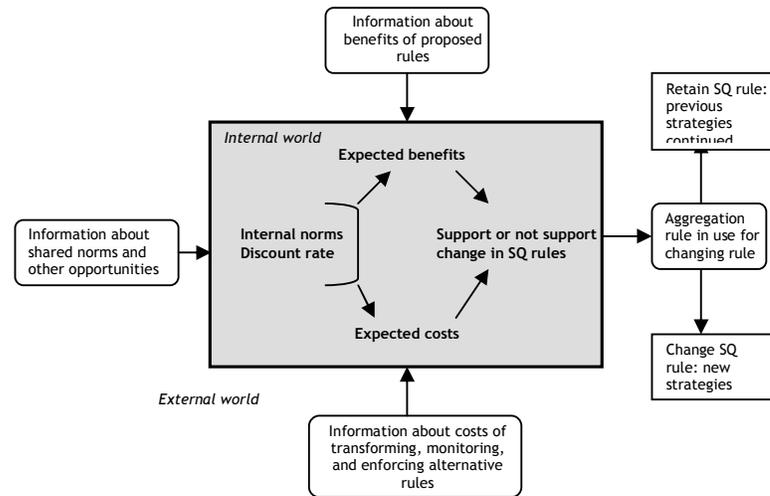
the market model heavily relies on a defected judicial system, gives rich water users an extreme bargaining advantage in existing water user associations compared to the large group of underprivileged peasant farmers (Galaz 2004). Hence it is not economic inequality *as such* that explains the outcome (i.e. redistributive CPR-institutions), but rather how this is made credible by external institutions.

III. POWER AS A FOCAL POINT - ADDING NEW PIECES TO THE PUZZLE

Natural resource users trying to overcome the tragedy of the commons are dependent on their ability to design and maintain institutions. While institutional choice might seem to be a one-time choice, the process in reality is far more dynamic. The reason for this is not only that defection is a possible strategy at all times in repeated interactions, but also that social and environmental change and surprises are an inherent property of both social and ecological systems (c.f. Levin 1999, Berkes et. al. 2003). Consider a CPR-institution designed by coastal fishers to manage commonly shared fishing resources. While the first decision on how to design various allocation rules to manage the resource might work in the beginning, the fact that the resource fluctuates naturally or unexpectedly, or that their political and social environment might change as time goes by (e.g. Levin 1999), forces the group to reconsider their institutional choice.

In her seminal work Elinor Ostrom (1990) identifies the following factors as the main internal variables behind institutional choice: expected benefits, expected costs, internalized norms, and discount rates. Individuals are assumed to weigh expected benefits and costs as they are affected by internal norms and discount rates and hence select strategies whose expected benefits exceeds costs. Expected benefits and costs are in turn affected by available information (Ostrom 1990:194f). Moreover, various situational variables such as the number of decision makers, heterogeneity of interests, past strategies of leaders affect the information about expected costs and benefits (Ostrom 1990:199f and 203f), while other variables such as whether the appropriators live near the CPR affect the internal norms and the discount rate of the actors (Ostrom 1990:205f). Refined and extended versions of the framework (often called the Institutional Analysis and Development (IAD) framework) has been applied to several and widely differing settings around the world such as the evolution of coffee cooperatives in Cameroon to the regulation of the phone industry in the U.S. (Ostrom 2005), indicating its significance and wide spread use.

Figure 2.1. Institutional Choice in “Governing the Commons”



Comment: The figure shows the factors assumed to affect institutional choice in CPR-regimes. From Ostrom (1990:193)

Power in the Commons - Adding New Pieces to the Puzzle

One interesting observation to be made from Figure 2.1 is that natural resource users are treated as a homogeneous collective unit. Although it seems reasonable - at least from a rational choice perspective - to assume that natural resource users are motivated by how they evaluate the expected benefits and costs of rules, the simplified model does *not* capture the two aspects that have been discussed in the previous chapter: 1) the inherent distributional conflict in cooperative situations and 2) that actors sometimes differ in their possibility to credibly commit to their most preferred strategy (see Chapter 2).

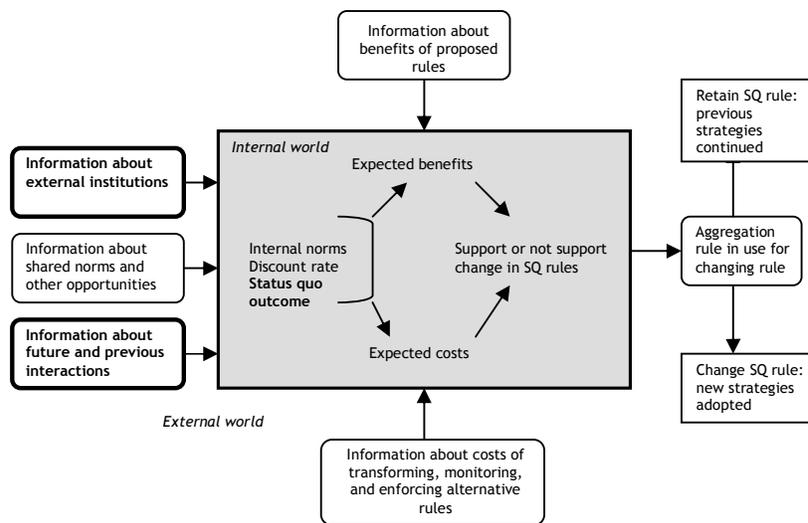
While similar aspects such as the role of leadership and economical heterogeneity have been discussed in important later publications in the field, aspects of distributional conflict seem to be both theoretically and empirically underdeveloped (e.g. Ostrom 2005, Ostrom 1990:188,213; Ostrom 1998a:15, Hardin 1982:67-89, Ostrom et. al. 2002). This “blind spot of collective action” is most obvious in cases in related fields of research where institutional emergence and change in the commons is studied as an evolutionary process (Richerson et. al.

2002), or using conceptual tools borrowed from immunology and linguistics and hence as self-organizing complex adaptive systems (Janssen 2002).

The argument in this thesis is different. I argue that differences in distributional interests (i.e. over CPR-institutions with different distributional consequences) and bargaining resources defining the actors' credible commitment, affects the distributional consequences of cooperation (see Chapter 2). Hence though shared norms of cooperation might develop, they might be skewed to the advantage of certain actors.

I realize that this alternative definition might seem too general and abstract. But it is not so much the definition per se that is important, as the type and style of theorizing it encourages. No framework or model is able to capture the full richness of the considerations facing participants in field settings.

Figure 2.2. Power in the Commons - A Different Framework



Comment: A different approach to institutional choice in CPR-institutions. Added factors marked in bold.

The ambition is nonetheless to illustrate the major underlying problems that participants face. The purpose of the framework is to roughly illustrate the types of situations actors face, rather than being a complete analysis of the full range of situations and strategies that

could be undertaken (c.f. Ostrom 1995:129). This alternative view is illustrated in Figure 2.2.

Based on my discussion in the previous chapter, two important aspects are added in the framework. The first has to do with the external institutions available for the actors in case cooperation breaks down. The second has to do with the “history of play” of the actors, in the figure denoted “information about previous interaction”. Both these factors are assumed to affect how actors evaluate their status quo outcome, and hence the expected benefits and costs of proposed rules. These factors are described below.

Information about External Institutions

Social interaction seldom occurs in an institutional vacuum. In an institution-free context, individual actors are constrained only by physical limitations and by the countermoves of other actors. This is the expectation shared by models claiming the emergence of “spontaneous social order” as hypothesized by Hayek, and Waltz’s analysis of the inherent anarchy of the international system (Scharpf 1997:98f). Natural resource users within a nation-state however, seldom interact under conditions of anarchy. Their choices are constrained either by formal rules - such as national legislation, by the possible responsibilities and limits posed by their formal position in the political system - or by less formalized expectations from actors outside the interaction (c.f. Ostrom 2005). From our perspective (i.e. the Battle of the Commons Game in chapter 1), the information about external institutions of interest *are those that define how actors evaluate their status quo outcome in case cooperation fails*. The concept is similar to Fritz Scharpf’s “Institutional Setting” (Scharpf 1997:47ff), yet the definition here is intentionally narrower to fit into the bargaining approach assumed in the study. Put differently, the analysis here is on the external institutions that define the players’ break-down values (c.f. Golden 1997, Knight 1992). The concept also has some similarities with what in negotiation theory has been denoted BATNA (Best Alternative To a Negotiated Agreement, see Fisher and Ury 1981), which is assumed to seriously affect the parties negotiation power in their reach for a cooperative and joint beneficial agreement.

While this might seem like a much too vague definition for a concept crucial for the analysis, where one draws the boundary of external institutions depends on the theoretical question of interest (Crawford and Ostrom 1995:582). However, these henceforth called “external institutions” contain three crucial characteristics, which enable a more precise definition.

First, they are exogenous to the players and hence defined by higher hierarchical levels than those created by natural resource users

themselves (henceforth CPR-institutions). This resembles what by some is called “formal collective action arenas” (Ostrom 1990:53), or “institutional setting” (Scharpf 1997:44ff).

Second, they contain both a formal as well as an informal component. While formal legislation certainly determines the degree of freedom actors face, so does less informal “rules”, such as standard operating procedures or norms of conduct. We will seriously misinterpret the incentives actors face by focusing too narrowly on purely formal aspects of external institutions. As will become clear in the empirical analysis later, these hard-captured informal rules have a fundamental impact on social interaction.

Third, these external institutions are mutually understood by the actors and hence constitute part of what is to be considered as their “common information” (c.f. Crawford and Ostrom 1995:582).

Information about Earlier and Future Interactions

Another factor crucial for understanding how natural resource users evaluate the possibility of cooperating and overcoming the “tragedy of the commons”, is the “history of play” of the actors involved (Ahn et. al. 2001, Schmidt et. al. 2003). As discussed earlier, part of the solution to the multiple equilibria problem - at least if we want to use these models empirically - *lies in the subjective expectations* of social actors. Past history may thus act as a mechanism that enables them to coordinate in selecting between the multiplicities of potential equilibria to which we know repeated interactions give rise. This becomes even clearer from a bargaining perspective, where previous interactions provide a fundamental piece of information to actors trying to estimate the credible commitment of others (c.f. Knight 1992, Elster 1989, c.f. Ostrom 1990:186, Sebenius 1992:22).

Consider two actors (A and B) interacting in the Battle of the Commons game described earlier. Assume that player A is underprivileged hence with a weak bargaining position, while player B is wealthy. One way for the poor player to estimate the credibility of the other players commitment, is to use information provided by:

- Earlier interactions with the same actor (B)
- Earlier interactions with a similar actor (B')
- Earlier interactions between actors such as her/himself (A') and the likes of the other actor (B')

Though this might sound like a vague definition (see Payton Young 1998:27-30 for an elaboration) imagine the interaction involving underprivileged peasant farmers in Latin America and large landholders. Or a case involving women and men sharing a forest

common in a highly patriarchic community. What these two cases have in common is that these actors have a common, well-known history of social interaction suggesting that conflict resolution seldom is to the benefit of the weaker party. From a bargaining perspective, this common information in itself provides the stronger party with a bargaining advantage (Knight 1992:40ff, c.f. Schelling 1960:58ff, Elster 1989:10). Put differently, this is where history matters.

Whether the game is played one time or repeatedly is often identified as a major factor affecting the possibility of cooperation between self-interested actors. The argument is that participants playing an indefinite rounds of social dilemma games, “can lead them to adopt a conditional cooperative strategy so long as other participants also cooperate” (Ostrom 2005). The perspective on how actors evaluate future interactions in this alternative model is however, slightly different. When interaction is repetitive, the actors could be concerned about their reputation. With repetition, actors might want to establish a reputation for toughness that is designed for long-term rather than short-term rewards (Raiffa 1982, Fearon 1998).

Evaluating the Status Quo Outcome

The information actors have available about the external institutions, and the information available concerning earlier interactions is thus hypothesized to be taken seriously by actors to evaluate their status quo outcome, i.e. the alternatives they face in case cooperation breaks down. Put bluntly, actors are assumed to include both what they have to lose if cooperation breaks down (using information available on the external institutions defining their break-down values), and the credibility of their counterparties moves (using information about previous interactions) in their evaluation of the costs and benefits of institutional choice.

Summing Up

The impact of economic and social inequality for collective action has been a well-debated issue. One important reason for this is that such an analysis requires examining a large number of variables as the potential number of different constellations of situational and institutional factors will be extremely large.

While the first chapter dealt with the potential distributional conflict inherent in natural resource management cooperation, this chapter has tried to specify one factor that might seriously affect the outcome: external institutions. As I argued earlier, a rigorous analysis of these institutions might provide a way to understand the ambiguous results in earlier studies dealing with the issue. The chapter has also

presented an alternative framework that takes both distributional conflict and external institutions seriously, hence trying to specify the impact of power heterogeneity on collective action.

Although the analysis in this book is based on case studies, the ambition is to avoid yet another conventional CPR-study. I do this not only by focusing on one key aspect of CPR-institutions, but also by applying game theoretical analysis as a way to link the empirical studies clearer to theory. In addition, I present an alternative framework that enables a structured and cumulative elaboration of the factors that structure the strategic interaction between natural resource users (c.f. Ostrom et. al. 1994:23-27, Ostrom 2005, Morton 1999:22ff). In short, this thesis intends to analyze in detail one poorly understood, yet crucial issue: how power affects the governance of the commons. Defining and empirically studying “power” is nonetheless far from a simple and uncontroversial task. This is the issue of the next chapter.

Chapter 3

Game Theory and Power as a Focal Point

On a mid-April afternoon, I took the Metro in Santiago to the subway station “La Moneda” to meet with one of my interviewees Cristián Correa, lawyer and former director of the Chilean governments “Access to Justice Program”, a program targeting the immense judicial needs of underprivileged communities in Chile.

As I arrived to the address Mr. Correa had given me when I spoke to him on the phone a couple of days earlier, I was surprised by the Spartan furnishings in his new working place at the Ministry of Justice. The fourth floor inhabited the staff of a fairly new government program designed to offer judicial assistance to Chileans who suffered imprisonment and torture during the military dictatorship. I left the office one hour later not only with new contacts, phone numbers and interesting stories, but also with an insight into how differences in social and economical power among Chilean water users seemingly affected norms to resolve water conflicts.

In this chapter I use game theory to specify power and its impact on collective action in natural resource management. I argue that game theory has one advantage to alternative approaches to study “power”; i.e. by clearly spelling out a detailed mechanism. I also discuss the shortcomings of the rational choice approach compared to earlier classical attempts to analyze the impact of ‘power’ in politics and everyday life. I do not however, intend to provide a general definition of power in this chapter (c.f. Barry 1976, Clegg 1989, Morriss 1987). My aim is instead to provide a definition that is both precise - i.e. fits into the research agenda of CPR-research - at the same time as it takes the historical debate among social theorists on power seriously. This is why the analysis in this thesis differs significantly from earlier research attempts in the field.

The chapter is organized as follows. First, I elaborate how game theory can contribute to a more fine-grained analysis of “power” in society. Here I also discuss how empirical game theoretical analysis can benefit from existing theories of power, and define some key terms to be used in the book. Second, I discuss the assumptions underlying the analysis of ‘power’ from a game theoretical perspective using one

simple game as an example. The chapter ends with a summary of the argument; that actors interacting repeatedly or having a history of play, might use their existing asymmetric power relation as a focal point to overcome strategic uncertainty in the commons.

I. GAME THEORETICAL PERSPECTIVES ON POWER

Game theory models interdependent actions, i.e. when the actions of two or more individuals or collective actors *jointly* determine some outcome (Scharpf 1997:5ff). Using game theory to study 'power' in society and politics is however far from an uncontroversial task (c.f. Udehn 1996, Goverde et. al. 2000, Hayward 2000). As Henri Goverde and others claim:

[I]f we accept that power is at the core of such an [political] analysis - the rational choice economics of the market is sufficient to explain neither the empirical *nor* the normative aspects of the relationship between individuals and society. Nor is the role of culture, as in anthropology, nor the way the individual's minds work, as in psychology, nor the abstract studies of intellectualized discourses, as in philosophy, nor the eclecticism of sociology [...]. (Goverde et. al. 2000:5).

This critique is - as I argue below - both misleading and incorrect. Using the theory of games is a research approach that despite certain well-known limitations (e.g. Green and Shapiro 1994, Ostrom 1998) might help us to clarify and expand some of the old conceptual trenches in political science. But what does a game theoretic perspective on 'power' really mean?

One fundamental assumption according to this perspective is that the choices of social actors are shaped by the social environment in which they find themselves. The type of game that the players are engaged upon may therefore be said to be constituted by the incentive structure. Game theory provides a way of visualizing social structures and examining the effects of those structures upon individuals' interdependent decisions, hence providing a way of examining both social and political conflict and the structure and sources of 'power' in a society (e.g. Roemer 1986, Scharpf 1997, Knight 1992, Dowding 1991).

Rationality, Uncertainty and Power as a Focal Point

But the contribution goes both ways. That is, not only can theories of "power" benefit from game theoretical reasoning, but game theory itself could benefit from taking non-formalized theories of power more seriously.

The argument is as follows. If actors share a common history of interaction, and are imbedded in an asymmetrical power relation (to be defined below), these shared perceptions will provide a crucial focal point for actors. These “shared perceptions” might be the following: poor fishers always expecting multi-national fishing companies to heavily sanction any defection from the agreed fishing quotas - but not the other way round; underprivileged peasant farmers always expect large landholders to withdraw from maintenance from a commonly shared canal if defection is detected - but not the other way round; downstream water users who expect upstream water users to exit their commonly crafted extraction rules if the former demands a larger share of the resource - but not the other way round.

The importance of these “focal points” in social interaction should not be underestimated. People make decisions all the time, and natural resource users are no exception. Our cognitive capacity is however limited and actors tend to develop heuristics, i.e. smart strategies or decision rules to tackle a complex and uncertain world (Janssen 2002:84ff, Ostrom 1998b:11f, Jones 1999). As discussed in previous chapter, natural resource users face significant uncertainty about how other players will respond to the multiplicity of equilibria of repeated plays, a fact that seriously calls into question the rationale for playing an equilibrium strategy. Consider a simple case of strategic interaction. Two people are asked to name a number between 0 and 100; they are also told that if the sum of what they name is less than or equal to 100, each receive the dollar equivalent of the number s/he named. But if the total is greater than 100, both get nothing. They can not communicate which impedes their possibility of agreeing beforehand on a pair of numbers. Each has to guess what the other is going to name, and each is aware of that the other person is similarly guessing about this number. There are many possible solutions to this “game”. More precisely, every number combination that sums to 100 or less is an equilibrium, but unless we are able to specify in advance the individuals’ mutual beliefs in this strategic context, we will be unable to predict the outcome (Crawford and Haller 1990:572f, Bicchieri 1993, Kreps 1990:95ff).

One way to overcome the problem of “strategic uncertainty” (Crawford and Haller 1990) is to allow for rational responses to be sensitive to the prior beliefs of actors about how other players will respond to it. This issue was elaborated by Thomas Schelling (1960) in one of the classic works of game theory. Schelling argued that actors are sometimes able to coordinate their behavior by drawing on shared perceptions that particular ways of coordinating are ‘salient’. Put differently, actors coordinate their behavior by using so called “focal points” - “the intrinsic magnetism of particular outcomes, especially those that enjoy prominence, uniqueness, simplicity, precedent, or

some rationale that makes them qualitatively differentiable from the continuum of possible alternatives” (Schelling 1960:70). This is how ‘power’ becomes important in game theory in general, and in repeated games in particular.

Moreover, repeated interactions might make actors converge to this focal point (c.f. Tsebelis 1990:34). The reason for this is that while social actors learn, they modify their behavior. Put simply, a “weak” natural resource user that underestimates the bargaining power of a “stronger” party in period t has rather strong incentives to change his/her behavior at period $t+1$. While the possibilities of learning has been recognized by theorists discussing the possibility of cooperation in repeated games with symmetrical pay-offs (e.g. Axelrod 1984, Ostrom 1998a,b and Bicchieri 1993:29ff), my argument is that the same logic could be applied to the Battle of the Commons game described in chapter 2.

The empirical and theoretical task is obviously much more complicated than this. As I discuss in the following sections, using game theory to discuss the impact of ‘power’ in the creation and maintenance of CPR-institutions results in a number of fundamental - and what some would consider questionable - assumptions. These assumptions are those resulting from studying ‘power’ as a *dispositional property*, focusing on *individual* rather than structural ‘power’, by specifying the *social mechanism* rather than elaborating various independent variables (e.g. Elster 1998), and by intentionally limiting the definition of ‘power’ to contribute to *earlier theoretical studies* focusing on collective action in natural resource management, rather than giving a more general definition of ‘power’ from a rational choice perspective (e.g. Dowding 1991). Allow me to discuss each of these aspects opening up with a simple example.

An Example

The conflict between upstream and downstream water users is recognized as a major problem in canal systems and river basins. The issue is that a privileged upstream user can use his/her advantage given by his/her geographical location by “moving” first. This “move” could be to continue to cooperate and extract the amount of water as agreed with downstream users. Another alternative would be to defect from this agreement and extract more water, thereby affecting the availability of water of downstream users. In this simplified setting, the possibility of maintaining cooperation heavily depends on the possibilities of actors to monitor each others' actions, and their access to low-cost conflict resolution arenas (Ostrom 1990, Ostrom 1995). Cooperation can hence - under certain conditions where reciprocity, reputation and trust can help to overcome the strong temptations of

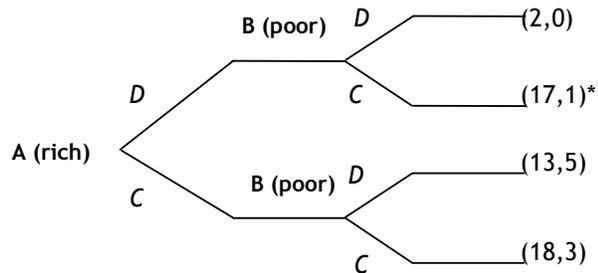
short-run self-interest - be maintained in equilibrium between two or more actors (Ostrom 1998a,b). Recent work on institutional analysis and institutional change begins to provide a solid theoretical foundation for understanding the conditions needed for individuals to craft their own institutions and enforce these institutions themselves.

However, as discussed previously, something very important happens in this game if i) cooperation with different distributional consequences is possible, and ii) if one of the actors is able to credibly commit to his/her most preferred strategy.

As the two-person extensive game in Figure 3.1 shows, decision-making is sequential so that one player (the follower, B) can observe what the leader (A) has done before deciding his/her own action. In this situation, asymmetric payoffs exist reflecting economic inequalities within the small group. The exact sources of this inequality are secondary for the intention of this example, but could be the result from differences in financial assets, exit alternatives such as alternatives sources of income options, technology etc.

The first figure in the parenthesis represents the first player's payoff (i.e. Player A), and the second Player B's. More precisely, if the players reach the upper branch of the game tree, the pay-off is 2 for player A, and 0 for player B. Consequently, if they reach the bottom branch, the pay-offs are 18 for A, and 3 for B.

Figure 3.1. The First Mover Advantage



Comment: A 2 x 2 asymmetrical one-shot game with sequential moves. The first figure in the parenthesis reflects A's payoff, and the second B's. Actors are assumed to have perfect information, and prefer as high pay-off as possible. * denotes the Nash-equilibrium. Remade from (Baland and Platteu 1996:84f)

Consider now the choice situation facing player B. If we assume that this player is trying to maximize his/her own payoff, this player should play C if A plays D, and play D if A plays C. (Note that to play the opposite strategy would lead to a lower payoff). The strength of player A lies in the fact that s/he is able to take B's expected reaction into consideration before making her/his decision. In this case, it is obvious that that A will choose to play D in the expectation that player B will choose C. The outcome (D,C) is therefore the unique subgame-perfect Nash equilibrium (Baland and Platteu 1996:84).

Note however that it is essential that the first move by the richer party to defect is perceived by the poorer party as *credible*, i.e. as an unmistakable signal about the intention of the former. It is the ability of the richer party to commit himself/herself to a particular plan of action and to signal it in a credible way that constitutes the source of his/her ability to get his/her most preferred alternative (Baland and Platteu 1996:84, Knight 1992, Schelling 1960:20ff, Elster 1989:80ff). If such imbalance in credibility did not exist, both the game and its prediction would fit poorly with the situation described.

More interestingly, the mechanism described above is not unique for conflicts among upstream and downstream users. The same problem can emerge between actors sharing a common lake, an aquifer, a forest common, or fishing resources in coastal waters. It is important to note that while the "first-mover advantage" in the latter cases is *not* provided by geography, but by the mere fact that one (or a group) of the players have the technological, social or economical resources available to defect while still maintaining the other actors' cooperation. As in our example, this may happen when players B's continued livelihood is threatened by the disappearance of a CPR-resource, whether it is to maintain an irrigation system, preserve fishing resources, a forest commons, an important aquifer or a commonly used lake. Unfortunately, it is not difficult to find real world examples in which poorer segments of the population have a vital interest in the preservation of common properties, while the rich do not have that concern because they have exit options available (Baland and Platteu 1996:86).

Defining Power

Now to an important issue that remains to be elaborated, i.e. the definition of 'power' to be used in this thesis. The definitions are the following:

A has 'power' over B	^{def} the capacity of A to commit credibly to his/her/it mostly preferred alternative hence gaining a distributive advantage in comparison to B (c.f. Dowding 1991, Dowding et. al. 1993, Knight 1992).
asymmetrical power relation between A and B	^{def} a social relation involving at least two actors in which the power holder exercises greater control over the behaviour of the power subject than the reverse. The opposite is interdependence and mutual influence of equal strength (c.f. Wrong 1979:10).
A has power resources	^{def} bargaining resources that give the actor a bargaining advantage compared to others. The bases of these resources are defined by the actor's reputation as a result from previous interactions, and differences in break-down values (see Chapter 2).

These definitions should be seen as an attempt to provide a definition of 'power' that takes both game theoretic reasoning and the historical debate among power theorists seriously. The assumptions that underlie these definitions, and foundations and sources of this 'power' are discussed below.

II. ASSUMPTIONS

Power as a Dispositional Property

Political science is about explaining political phenomena. That is, we are often interested in "attempting to infer beyond the immediate data to something broader that is not directly observed" (King et. al. 1994:8). While this might seem obvious, the debate among social theorists on 'power' has been quite intense. Part of the debate has centered on the consequences of studying 'power' as a capacity latent in social actors rather than as description of an event. This is what some refer to the difference between "having power" and "exercising power" (see Wrong 1979:6ff, Baldwin 1979:163f, Morriss 1987:20ff). Polsby (1963), one of those who reject the dispositional nature of power asks:

How can one tell, after all, whether or not an actor is powerful unless some sequence of events completely observed, attest to his power? If these events take place, then the power of the actor is not “potential” but actual. If these events do not occur, then what grounds have we to suppose that the actor is powerful? There appears to be no scientific grounds for such supposition [...].

Polsby is not alone. Robert Dahl chose in his seminal *Who Governs?* (1961) to use a causal definition of power after finding it impossible to discover the capacities of individuals in his chosen field studies. The argument is that while actualities can be observed, potentialities can not (Dowding 1991:4f). And it is of course true that one can not tell whether an actor is powerful unless some set of observations attest to his/her power. On the other hand, the obvious risk is that the only explanations we provide are a mere *post hoc* description of events.

Consider the following example. Government Official G makes Chief Environmental Inspector C to do *a*, instead of *b* which is C's preferred alternative. The simple explanation to why this action was chosen by C “G has power over B” is clearly incomplete and unhelpful. More precisely, this explanation does not define the sources of G's power over C (i.e. is its foundation formal, or a result of personal characteristics of the actors?), nor the scope of G's power - i.e. how often and how far G can force C to assume actions he/she does not prefer (Wrong 1979). An adequate explanation must hence do more than repeat what needs to be explained (Morriss 1989:43). This is the main reason why ‘power’ is better viewed as *capacity* latent in the actor, rather than an *actual performance*. Though this separation might seem like a theoretical artifact (Wrong 1979:7f), the different approaches do seem to lead to slightly different kinds of analysis (Morriss 1987, Dowding 1991).

There is no simple way to observe power, and I do not intend to solve the issue of the latency of power here. I will simply conclude by arguing that it is possible to categorize an actor as ‘powerful’ by studying previous behavior and combining it with a general knowledge of what kind of resources that give actors the capacity to dominate others, without providing a mere *post hoc* description. To do this however, we need both a theory of action (Dowding 1991:23-29), and an appropriate research design (Morriss 1989:145f) that allows us to tease out the causal inference of “power” on institutional emergence and change in this thesis. The theory of action is provided by rational choice theory, and the research design by earlier “community power” researchers (the latter is the issue of the next chapter).

Structural versus Individualist Accounts

Another important division among theorists of 'power' is whether studies should focus on agency or structure (Govende et. al. 2000:1) or on macro or micro aspects of power (Brass and Burkhardt 1993:441ff). One important difference between these perspectives is that structural sources of 'power' reflect the properties of a social system rather than the particular attributes or behavior of any particular individual or interaction. These agentless structures "imposes the ultimate constraints on the individual" (Brass 1984:518, c.f. Hayward 2000). Others argue that some macro-level explanations can not be replaced with micro-level ones. Macro-social categories such as capitalism, the state, class relations are according to this view not simply irreducible to micro-level processes (e.g. Levine et. al. 1987:73ff). The claim that this kind of structural models often have underdeveloped conceptions of human agency has been raised by several theorists (Mizruchi 1994:338f).

Although the structural and individual approaches can be analyzed as competing explanations of 'power', the assumption made in this thesis is that the two approaches can be understood as simultaneous, complementary processes. However, and as can be read from the example earlier, the elementary causal agents in this thesis are individual actors, and explanations always include explicit references to the causes and consequences of their actions. Actors must nonetheless take their social environment, and the information they have available seriously. This combined approach becomes clear in the example presented above. The fact that the outcome is to the benefit of the first "rich" player is the result of a combination of both "structure" (i.e. the rules of the game) and individual action (i.e. players trying to anticipate other players' action, and trying to achieve their most preferred option).

The choice hence does not lie between agentless structures and structureless agency: the structure is a structure of human agency. While considered debatable by some, the approach used in this thesis does not differ from other approaches in the social sciences such as neo-institutional theory (Rothstein 1996, Ostrom 1990), institutional economics (North 1990), rational choice sociology (e.g. Macy and Flache 1995) or parts of organizational theory (e.g. Brass and Burkhardt 1993).

An important note should be made here. Some aspects of "power" are however, obviously difficult to capture using the approach suggested in this chapter. Put bluntly, the different perspectives in analyzing power could be summarized in the following way. Under the first face of power, the central question is: "Who, if anyone, is exercising power?" Under the second face: "What issues have been

mobilized off the agenda, and by whom?” Under the third and radical conception: “Whose objective interests are being harmed”? Under the fourth face the central question is: “What kind of subject is being reproduced?” (from Diseger 1992:980).

Pierre Bourdieu’s analysis of how categories of perception of the social world are created in such a way to maintain the established order, and thereby to the interest of those who dominate it (e.g. Bourdieu 2001) is in stark contrast with the analysis to be assumed in this thesis. Foucault’s analysis of the “fourth face of power”, that is power operating in structures of thinking and behaviour, and where subjects are not presupposed as in other definitions (Digeser 1992), is another example. In short, the studies mentioned above differ from the one to be assumed in this book where the intentional action of individual social actors is at the centre of analysis.

Despite radical differences concerning how power is to be defined and analyzed, I see no reason why both Bourdieu’s and Foucault’s analysis cannot inspire and expand rational choice based analysis’ of power. Consider Bourdieu’s analysis of how privileged strata in society transfer key resources between generations, and how preferences are reproduced within these different *habitus*. Though Bourdieu’s notion of *habitus*, *fields* and *capital* implies a radical break with earlier focus on the motivation of action through individual intentions (Mottier 2002, Danielsen and Nordli Hansen 1999), it should be possible to combine a historic analysis of how social groups maintain and transform important social resources, with a rational choice analysis of how these resources provide actors with a bargaining advantage to other weaker social groups in strategic interactions. How various sorts of “power resources” are created and maintained, or how preferences are formed are issues where mainstream power theory can contribute to game theoretical analysis (c.f. Frolund Thomsen 2000).

A Different Focus - Specifying New Facts and Social Mechanisms

The third important observation from the example presented above (Figure 3.1) is that this kind of interdependent strategic behavior is difficult to analyze without the theory of games. More precisely, none of the seminal definitions of “the three faces of power” are precise enough to analyze this sort of social interaction.

Consider Dahl’s classical definition of the “first face” of power: “A has power over B to the extent that he can get B to do something that B would not otherwise do” (Dahl 1957:202f). While certainly useful for the analysis assumed by “community power” researchers in the 1960’s and the 1970’s, the definition obviously lacks precision if we take the interdependence of human interaction seriously. Consider the classical

“Battle of the Sexes Game” (see e.g. Scharpf 1997 for a description). Does the fact that one of the player’s gets his/her second preferred alternative, imply that the other has “power” over him/her? Or consider the game described in Figure 3.1. The fact that the “poor” player’s preference structure affects the strategy of the “rich” player (i.e. makes A to “choose” the payoff 17 instead of 18) can hardly be described as a situation where B has “power” over A. These are only two examples of the implications on classical definitions of “power” once we take the interdependence in social interactions seriously. Using other definitions of “power” does not solve this deficiency.

Bachrach and Baratz argued that Dahl had not adequately tested the hypothesis that a ruling elite really controlled New Haven politics. Their argument is that using policy formation as empirical data on the distribution of power ignored the possibility that power was also exercised in control of the agenda of political discussion (Bachrach and Baratz 1970). Another alternative is to define “power” as “the possibility of A to affect B in a manner contrary to B’s interest” (Lukes 1974). While both these phenomena - i.e. control over agenda setting and the shaping of the desires of others - certainly can be understood using rational choice theory (e.g. Scharpf (1997:124) on strategic misinformation, Morton (1999:69ff) on agenda-setting and Dowding 1991:95ff on the “third” face of power), none of the classical definitions are precise enough to capture the strategic interaction exemplified in Figure 3.1. “Precise” in the sense that they do not provide the analytical tools to understand under what circumstances A will stop exploiting B, under what circumstances B will resist rather than submerge to A’s power, or how this asymmetrical power relation might be broken by an external agent (e.g. Hunter 1953, Wolfinger 1971). Put differently, none of them are precise enough to provide what I would like to denote the *social mechanisms* of power.

The Social Mechanisms of Power

Consider again the analysis made in conjunction with Figure 3.1. This rational-choice explanation suggests the existence of a mechanism built upon hypothetical constructs such as preferences and strategies. Despite important problems in the theory of rational behavior (e.g. Elster 1993, Udéhn 1993) by spelling out a detailed mechanism linking individual behavior and rewards, the rational choice theory provides a more fine-grained explanation than e.g. behaviorist theory (Hedström and Swedberg 1998:289, Dowding et al. 1993). This sort of analysis differs substantially from two alternative ways of studying “power” empirically.

The first is that it differs from a more descriptive analysis of power. More precisely, instead of explaining certain social outcomes

with: “A has power over B”, the rational choice analysis is: “A has the power to make B to choose a least preferred alternative because A can credibly commit to his/her preferred strategy due to difference in exit-options” (see earlier section in this chapter). Not only is the latter statement more precise, but also founded in a theory of action.

Second, this analysis differs from another research strategy assumed by researchers in the field focusing on quantitatively estimating the impacts of various independent variables (e.g. economic or technological heterogeneity) on the distributional impacts of CPR-institutions (e.g. Molinas 1998). More precisely, empirical regularities are observed, established through statistical methods, and a plausible argument consistent with the regularity finally is produced.

While none of these two alternative research strategies are “wrong”, the benefits of using rational choice theory to specify the social mechanism of power should not be underestimated (c.f. Tsebelis 1990:40ff, Morton 1999:41ff). As stated by Peter Morriss, “there is no easy mechanical way of establishing how much power someone has; the connection between a justifiable assertion that someone has power and the evidence for this is often complex and subtle” (Morris 1987:145, c.f. Freeman et. al. 1963, Baldwin 1979). Calvert (1989) and (Alt et. al. 1988) are two good examples of how the use of rational choice theory provides a way to tackle this problem.

Reciprocity - i.e. when actors repeatedly bears a short-run cost to provide a benefit to the other, provided that the other does the same - is one aspect of social interaction that is closely related with issues of collective action. As Calvert (1989) elaborates, it is possible for reciprocal behavior to be lopsided. The theoretical approach based on rational choice theory, derives the conditions under which fair distribution schemes are possible, but also the extent to which “exploitive” distributions are possible. Though the analysis in this example is strictly theoretical, the possibilities of combining theory with empirical evidence to elaborate power in social interactions is straightforward, and is surprisingly similar to the research strategy recommended by community power researchers (e.g. Hunter 1953:263).

James E. Alt and others (1988) for example, elaborates the “theory of hegemonic stability”, i.e. a “large” actor’s ability to affect distributional outcomes in a situation that involves both distributional conflict and cooperative benefits. By constructing a model involving repeated play, incomplete information and reputation, the authors are able to demonstrate how and in what circumstances hegemonic regimes might break down or appear unstable.

Studies that elaborate the impact of power asymmetries in social interaction using rational choice theory in a similar fashion are numerous (e.g. Harsanyi 1976, Roemer et. al. 1986, Dowding 1991,

Barry 1976, Midgaard 1976 just to mention a few). Hence, there should be no doubt that theory development in the field of collective action and power could benefit substantially from the use of rational choice models. And as I argue in the next section, it contributes to existing research on how actors overcome the well-known “tragedy of the commons”.

III. CLOSING THE CIRCLE - WHY POWER IS IMPORTANT

In his now classical study, John Gaventa (1980) analyzed the shaping of wants and beliefs of the people of the Clear Fork Valley in Appalachia by their employers - a British-based mining company. Gaventa argues that the employer deliberately shaped the beliefs and desires of the people by setting up incentive structures, and by controlling the press and local politics. Though the definition of power used by Gaventa certainly differs from the one used in this thesis, the ambition to specify and analyze the importance asymmetrical power relations play in social interaction is shared.

To be able to study power empirically however, we need to specify the contribution of this perspective to existing theory development in the field. This has been done throughout the chapter using insights from non-cooperative bargaining theory presented in the previous chapter. By discussing the assumptions underlying the study of ‘power’ - i.e. as a *dispositional property*, as *individual* rather than structural ‘power’, by specifying the *social mechanism* rather than elaborating various independent variables, and by specifying my contribution to *earlier theoretical studies* focusing on collective action in natural resource management, I position this study within previous theoretical and empirical studies focusing on social power in society and politics. But the study also intends to expand *beyond* previous studies. I do this by spelling out a detailed mechanism linking external institutions with individual behaviour, hence taking the analysis one step further.

More precisely, the account of power used in this chapter suggests that we need to study the bargaining resources of different groups in society, understand their preferences and model their relationship to one another. I also argue that when actors interact repeatedly or have a history of play, this asymmetrical relation might provide a focal point that helps actor to overcome strategic uncertainty. In other words, the fact that natural resource users differ in their possibility to credibly commit to their most preferred alternative, makes exploitation a highly possible outcome in the governance of the commons.

However, game theoretic models become interesting when they are applied to real situations which they resemble. The research design to be used is the subject of the next chapter.

Chapter 4

Research Design and Methodology

In the real world, strategic decisions by social actors are never made freely from a context. External institutions can not only seriously modify the payoff matrix of the Battle of the Commons game, but may also give some players a bargaining advantage that supports the creation of redistributive CPR-institutions over efficient ones.

In this chapter, I discuss some of the important methodological choices made in the thesis. First, I examine the logic behind the comparative approach used in this thesis. Second, I discuss the comparison between the countries chosen in this study; Sweden and Chile. Thirdly, I discuss common features of the case studies to be included in the thesis. These include the analysis of CPR-institutions created to manage water resources, the use of game theoretic reasoning, and the empirical data used such as strategically selected interviews, various sources of documents and quantitative material. In addition I discuss some unshared features of the case studies, and some of the problems they create for the comparison of the cases. Fourth and last, I discuss the potential and pitfalls involved in the application of game theoretical reasoning for empirical comparative analysis.

I. A COMPARATIVE APPROACH

Previous studies analyzing the impact of social and economical heterogeneity on collective action in natural resource management, have neither fully recognized nor elaborated the important role of “external institutions” in structuring the interaction between social actors (e.g. Varughese and Ostrom 2001, Bardhan and Dayton-Johnson 2002, Dayton-Johnson 2000, Molinas 1998). A comparative study is a possible and fruitful way to elaborate the impact of external institutions to the solution of the “Battle of the Commons Game” (c.f. Scharpf 1997:224ff).

Statistical analysis could have been a possible approach to carry out the analysis. I would however argue that our understanding of the interaction between social and economical heterogeneity, external

institutions and CPR-institutions is far too limited to make this possible. How external institutions form credible commitments is a hypothesis not easily made operationally for quantitative research (c.f. Hedström and Swedberg 1996). Furthermore, a case study approach is required to make the in-depth analysis needed to specify the bargaining resources, status quo alternatives and process behind the institutional solutions following from the “Battle of the Commons Game”.

I would nonetheless like to make two important notes here. First, I would like to emphasize that the intention with the case studies is not to *test* theory - even though some aspects of the thesis certainly point at that direction - but rather to use the cases to *elaborate* the connection between social and economical heterogeneity, external institutions and the distributional impacts of CPR-institutions. As will be seen however, the case studies do include testing *characteristics* to strengthen the causal argument. More precisely, I examine the assumptions underlying the operationalization of the model, I test alternative explanations when possible, and I highlight theoretical “new facts” combined with empirical evidence when possible (c.f. Morton 1999).

Second, the analysis assumed here departs from more structured comparative studies where the concrete methodology is the same across the cases. The logic behind the comparison in the following chapters has been to use slightly differing methods in the two countries to be able not only to adapt to the different local contexts, but also to more thoroughly elaborate *different* aspects of the distributional impact of CPR-institutions (see below for a more detailed description).

Why Sweden and Chile

The two countries chosen in this study are Chile and Sweden. There are several characteristics of water politics in these countries that may yield theoretically interesting insights.

Firstly, the countries differ substantially in the institutional framework surrounding water politics and water users. While Swedish water politics is strongly controlled and monitored by governmental agencies, Chile represents a rather extreme version of free-market approach to water policy. The countries chosen hence guarantee a large variation in our independent variable, which helps theory development by avoiding the problem of selection bias (c.f. King, Keohane and Verba 1994:137).

Secondly - and of theoretical interest - the choice will give us an insight in how self-organization is affected by the fact that CPR-institutions are created in what Scharpf (1997) terms “The Shadow of the State” - i.e. the state is able to influence negotiated agreements by shifting the balance of bargaining power from one side to the other

through changes in the institutional setting - and “Minimal Institutions” where state power is severely limited (Scharpf 1997:98f, 200f).

Thirdly, the choice coincides deliberately with two of the most disputed solutions to the well-known “Tragedy of the Commons”, i.e. governmental intervention vs. privatization (Ostrom 1990:8-13). The case study selection hence aims to reframe and specify a long-lasting debate among environmental policy researchers by focusing on the impacts of state dominated, and market dominated (external) institutions on collective action.

II. THE CASE STUDIES - COMMON AND UNSHARED FEATURES

The conclusions from the comparative study rest heavily on the following five common features of the cases.

First, they all deal with the emergence and distributional impacts of CPR-institutions created to manage water resources. While the exact characteristic of the water problems differ between the two countries, they are all theoretical similar, i.e. may all be described as CPR-dilemmas. That is, they deal with natural resources with high subtractability where exclusion is difficult, and there exists suboptimal outcomes and institutionally feasible alternatives (Ostrom et. al. 1994:6f, 15f).

Second, all cases in the analysis deal with CPR-institutions created by actors that are heterogeneous in terms of economical as well as social resources. In the Swedish case, I study CPR-institutions created by small and large municipalities, industrial interests and various interest groups such as farmers, environmental NGO’s and fishing organizations. In Chile, the focus is on institutions created by large and small farmers. In both these cases, the actors differ substantially on what is the focus of the thesis: bargaining resources.

Third, the cases are all analyzed using the Battle of the Commons Game presented earlier. My intention is to highlight how bargaining aspects seriously affect the institutional solution to the Tragedy of the Commons.

Fourth, the analysis of the possible distributional battle in designing CPR-institutions is strengthened by empirically evaluating the assumptions and predictions of the model. I do this by using naturally occurring data such as interviews with stakeholders and experts, official statistics, newspaper articles and other written sources (c.f. Morton 1999, see also following sections in this chapter).

Fifth and last, as much of the analysis builds on results from interviews, I apply the criteria associated with source analysis - i.e. time, dependence, authenticity and bias. The *time criterion* implies that human forgetfulness must be taken into account. The more time elapsed after an event, the less reliable the witnesses reporting on the

event. The *dependence criterion* entails that sources should be interdependent. If two sources are independent, the credibility of assertions common to both of them increases. This also implies a general ambition to go back to the primary source, and to check second hand information against an independent source. This test also applies to sources that might contain a *bias*. An involved party might leave out unpleasant facts or exaggerate or downplay important events, which might seriously distort the material (from Leth and Thurén 2000; Thurén 1997).

Unshared Features

Though there are important similarities between the cases, there are also some important differences originating from the fact that access to interviews, written material, and official statistics diverge substantially in the two countries. More precisely, while data and previous studies in the area are much more easily obtained in Sweden, research on issues of water politics in Chile is a rarity (Bauer 1998, 2004). The differences in research strategy in the countries are three: case study selection, application of the bargaining model and interviews. The points are explored below.

Case Study Selection

In a small-N study like the one in this thesis, selecting suitable cases is everything. The strategic selection of cases in Sweden builds on three reports (Gustafsson 1996), (Norman 1997) and (Vattenresurs AB 2001). The studies give a general overview of practically all water management CPR-institutions in Sweden. This richness in the description of the current status of Swedish water CPR-institutions, the fact that there is plenty ecological information available through the courtesy of the Swedish Water Management Program (VASTRA), and the rich official statistics available in Sweden, makes it possible to push the empirical validation of some key theoretical assumptions further compared to the Chilean case.

The scarcer material available in the Chilean case on the other hand, makes counterfactual reasoning more problematic. There is a general lack of overview and few studies of Chilean water CPR-institutions - as an example, there is currently no central register of the number and status of existing water user associations (Bauer 1998, 2004, Vergara Blanco 1998). Moreover, official statistics and ecological information is neither easily accessed nor complete, just like access to stakeholders in the field. By focusing on one of the most well-documented water conflicts in the country, and by complementing with additional field data such as interviews, newspaper articles and similar

studies made by other international researchers, I elaborate the impact of free-market institutions on collective action and bargaining between underprivileged and wealthy water users.

Game Theoretical Application

The operationalization of the game theoretical model also differs in the two countries. The reason for this is differences in the access to empirical data, but also differences in how straightforward the analysis was in each country. More precisely, while the connection between bargaining power and the distributional impacts of CPR-institutions was rather clear in the Chilean case, distributional conflict was more complicated to tease out in the Swedish one. In addition, the key issues that water users face in the two countries are indisputably different, which implies that the CPR-institutions designed by water users, are designed to tackle different problems related to water quality and quantity.

This results in a comparative study with a somewhat differing focus between the cases. The Swedish study deals with how institutional choice in CPR-institutions in terms of scope is affected by external institutions. The Chilean study on the other hand, deals with the impact of free-market institutions on conflict resolution between poor and wealthy water users in CPR-institutions. Both institutional choice and conflict resolution are key aspects of the function of not only CPR-institutions (Ostrom et. al. 1994, Ostrom 1990), but also institutions in general (Rothstein 1996). How these two issues are affected by existing power heterogeneities among interacting actors has however received limited attention.

Interviews

The fact that access to material and operationalization of the study differs between the case studies in the different countries also effect the selection of interviewees and structure of the interviews. The interviews in Chile are mainly made with various experts in Chilean water politics. The intention has been to get a general picture of the impacts of free-market institutions on peasant agriculture and on conflict resolution in the widely acknowledged water user associations. These interviews have been complemented with interviews with various actors with extensive field experience, e.g. lawyers, peasant and environmental NGO's and governmental officials. A majority of the interviews have been done in the field, i.e. in Santiago and its outskirts. A rough description of the questionnaire is presented in appendix 1 in the end of this chapter.

The interviews in Sweden, on the other hand, have been made with various stakeholders in one strategically selected area in southern Sweden. The ambition to avoid biased and one-sided material has forced a more thorough source analysis of the material. A rough description of the questionnaire is presented in appendix 2 at the end of this chapter.

III. VALUATING GAME THEORETICAL REASONING

As discussed earlier, various sorts of assumptions are crucial to the explanatory power of game theoretic models. Game theoretical reasoning - or rational choice theory in more general - has been extensively questioned and criticized (e.g. Green and Shapiro 1994, Udehn 1996). While some of the critique focuses on ontological assumptions or ideological implications, others centre on the claimed methodological pathologies, and limited empirical successes of rational choice theory. As Green and Shapiro phrase it in their work *Pathologies of Rational Choice Theory* (1994:4):

Hypotheses are formulated in empirically intractable ways; evidence is selected and tested in a biased fashion; conclusions are drawn without serious attention to competing explanations; empirical anomalies and discordant facts are often either ignored or circumvented by way of post hoc alteration to deductive arguments.

The claimed limited empirical power of rational choice theory hence seems to rest heavily on empirically evaluating key assumptions - such as preferences, game setting, and information - and conclusions of the model (Morton 1999, Bates et. al. 1998, Scharpf 1997). Fortunately, there are various ways to approach the methodological fallacies identified by critics, and in this thesis I apply some of them (e.g. Chapter 4 in Morton 1999). The next table summarizes the various aspects of empirical valuation applied in the different case studies.

Preference assumptions refer to the conjectures made about what alternatives the various players prefer in the distributive game. While their preference structure had to be validated using interviews and other material in the Swedish study, this was only done to some extent in the Chilean case. Note however, that I do not deduce preferences from behaviour which might lead to difficult methodological problems (Rothstein 1996:148), but rather from alternative empirical sources.

Game assumptions refer to the conjectures made about what legal and administrative aspects that structure the distributive game. These assumptions are evaluated using both written secondary material, and interviews.

Information assumptions refer to the assumptions made in the game of what actors know about the game, i.e. their and other players pay-offs. While this is a difficult task to make with primary data, estimates have been made in both countries using interviews complemented with earlier research, and other written sources.

Table 4.1. Empirical Valuation of the Case Studies

<i>Empirical Valuation</i>	<i>Chile</i>	<i>Sweden</i>
Preference assumptions	No	Yes
Game assumptions	Yes	Yes
Information Assumptions	Yes	Yes
Alternative Explanations	No	Yes
Predictions and “New Facts”	Yes	Yes

Concerning the empirical assessment of *alternative explanations*, this criterion implies a general ambition to elaborate the explanatory power of the model (c.f. Green and Shapiro 1994). Though this can be done contrasting the presented theoretical model with other theoretical alternatives (Morton 1999:242ff), the approach here is different. To be more precise, the causal argument made in the Swedish case is elaborated by testing alternative explanatory factors deduced CPR-institutional theory instead of using alternative theory. The benefits and drawbacks from this approach are discussed in Morton (1999:242f, 274f).

Valuating predictions and “new facts” means trying to assess the empirical implications of the possible equilibrium predictions. Sometimes this prediction yields earlier ignored insights into the interaction under study; insights that can be elaborated further with new empirical data. This is most obvious in the Chilean case where the operationalization of Battle of the Commons game point to other solutions to serious equity problems in water resources management than those presented by acknowledged policy experts in the country.

I would however like to emphasise an important point here. A ‘yes’ in the table above is not intended as a guarantee to the reader that the assumptions are “fully valued” or so well-elaborated empirically that alternative models are independent variables are impossible. My point is instead to point out that the analysis in the thesis includes the use of game theoretic reasoning that as far as possible has been evaluated and tested against empirical data.

IV. THE CHALLENGE OF OPERATIONALIZATION

Game theoretic models become interesting when they are applied to real life situations that they resemble. After all, it is their application that gives us an insight of the explanatory power of deductive models in political science. The use of these models is nonetheless far from unproblematic (e.g. King et. al. 1994:106) and the use of game theoretic models for empirical comparative analysis is relatively underdeveloped. The reason is that there seems to be few rules in how to apply rational choice in empirical settings (Golden 1997:12f, Scharpf 1997:5).

Consider the following challenges to the application of game theoretical reasoning for empirical studies: Real actors do not play one game, but probably play a whole host of games simultaneously with different players. The action situations in which they find themselves are more complex and the structure of the game is far from obvious. Social actors make mistakes, process information incorrectly, or misinterpret other actors' behavior and preferences. Moreover, real natural resource users do not come to the games they play in life with a simple preference ordering; they might develop and change with time.

How these issues are tackled is hence crucial for the explanatory power of the empirical studies of the thesis. Some of the most controversial assumptions in the empirical use of deductive models are related to the assumed *rationality of the actors*, the possibilities of empirically *assessing their preferences*, and the required simplification of the actors' *strategic interaction*. Each of these three points is discussed below.

Simplifying Complex Interactions

In the game theoretic models to be used in the thesis I will assume that two actors each have a set of preferences and are engaged in a "game" defined in terms of the relationship of their preference orderings. The game is thus a description of the structure in which each the actors finds him- or herself. The expected result occurs because rational individuals, knowing their own preferences ordering and the structure of the game will play to achieve the best pay-off given these circumstances.

Though this approach certainly abstracts a lot from reality, the ambition is to illustrate the major underlying problems and the types of situations actors face, rather than being a complete analysis of the full range of situations and strategies that could be undertaken (c.f. Ostrom 1995:129). There are obviously other research strategies that do a better job in taking the complexity and dynamics involved in

human cooperation seriously. Consider the work by Robert Axelrod summarized in *The Complexity of Cooperation* (1997). The use of agent-based models is certainly a fruitful approach in dealing with the high complexity of human interaction. The analysis is however mainly theoretical, or combined with extensive empirical data which might be a disadvantage if we are interested in analyzing concepts that are so context dependent such as credibility and power asymmetries.

Despite problems, I would argue that the approach assumed in this thesis has two major strengths: *theoretical clarity and parsimony*, and the possibility of applying *equilibrium analysis* (Tsebelis 1990:39-47).

The reason why game theoretic reasoning might help to provide clarity resides in that explanations are formulated in institutional terms, rather than in psychological or cognitive process terms. In a world that is exceedingly complex and in which we will only have the possibility of making few observations, our search for explanations must be ordered by strong prior expectations. Using game theoretic reasoning might provide a framework with explanatory potential, and endow us with clearly defined and universal micro-foundations of how individuals will act in different institutional settings. At best, this implies that *ad hoc* explanations can be eliminated and that empirical evaluations can be achieved (Ostrom et. al. 1994:25f, Scharpf 1997:29f).

The fact that game theoretic reasoning sometimes is able to provide empirically testable predictions (equilibrium analysis) hence implies that conditional questions can be asked (Weingast 1996). As an example: what would happen if more information about the judicial rights of water users was provided to underprivileged water users in Chile? Or if the Polluter-Pays-Principle was abandoned in the creation of water resource institutions in Sweden? As will be showed in the empirical analysis, both our intuition or alternative theories might provide us with incorrect answers (Tsebelis 1990:41f, Morton 1999:69ff).

Studying Preferences

“Preferences” is a key concept in rational choice analysis of politics. Empirically assessing these preferences has nonetheless proven to be a far from unproblematic task. Consider the following statement by Rothstein (1996:148):

The problem is that, because it has no theory of where preferences come from (of what is “expected utility” for different actors), it must generally deduce preferences from behavior: the dependent variable is thus used to explain the independent, which in turn is reused to explain the same dependent variable. This is not only a serious shortcoming from the viewpoint of sound scientific methodology (cf.

Shapiro and Wendt 1992), it also creates problems because, at least in empirical research, it will be impossible to single out what type of behaviour reflects genuine or true preferences and what type is the result of strategic action.

It might seem like a simple solution to ask actors what their intentions are, but this is a research strategy destined to fall short. The reason is that actors have strong incentives to misrepresent their goals, which seriously might mislead the researcher (Golden 1997:13). The solution hence seems to lie on relying in strong theoretical propositions combined with good case study selection and alternative empirical data to infer preferences. In the realization of the case studies, this means the following.

In the Chilean study, I assume that water users prefer free-riding to being the one receiving the “sucker’s” payoff. Though this assumption might seem unsympathetic, it generates a number of interesting propositions that are elaborated empirically in the chapter.

The Swedish study however, has a more detailed elaboration of the assumed preferences of various actors. In short, I assume that there exists a conflict over institutional choice between those contributing to water related environmental problems, and those benefiting from improvement projects. These preferences are deduced theoretically, at they same time as I use indirect empirical evidence (i.e. indirect questions in interviews and documents) to evaluate the assumption.

On Rationality

Assuming rational actors might seem like a non-starter, and the reasons are several (e.g. Eriksson 2005). First of all, rational choice models have been accused of being unable to provide fully empirically valid predictions of the outcome of key games such as prisoners’ dilemmas. This argument has been presented in reviews of both experimental and field data (Ostrom 1990, Ostrom 1998, Green and Shapiro 1994). Second, the assumptions concerning the actors preferences - i.e. the impossibility of contradictory or intransitive preferences and ignoring the changing nature of preferences - have been seen by some as unrealistically demanding and empirically misleading (Udén 1993:251, Druckman 2004, Walt 1999). The question is hence: is rational choice a rational research strategy?

The diversity of research strategies by the rational choice community is impressive (Green and Shapiro 1994:17ff, Chong 1995), but an important part of the answer lies in how we define “rationality”. The literature discussing the potential and pitfalls of rational choice theory is - mildly put - abundant (e.g. Williams 2000,

Friedman (1996) and *Critical Review*, 1995, Vol. 9). I do not intend to summarize this still ardent debate as this is far beyond the ambitions of this thesis. I do nevertheless intend to present some of the assumptions underlying the game theoretical analysis in the empirical studies.

One important theoretical assumption in this thesis is that outcomes are the product of conflict among actors with competing interests. One important point here is that rational choice theory and game theory in particular, is able to capture the strategic aspects resulting from the actors' interdependence, of that social conflict. The rationality assumption to be used here might be considered a "weak" one and consists of the following three assumptions (c.f. Tsebelis 1990:24ff, Knight 1992:17-19).

First, I assume that actors do not hold contradictory beliefs or preferences. The reason for this is that an actor with opposing beliefs and hence preferences, simply is unable to choose among different alternatives.

Second, I assume "transitivity of preferences", i.e. that if an actor prefers alternative a over b, and b over c, s/he necessarily prefers a over c. The first and second requirement assures the actors ability to maximize (Tsebelis 1990:26).

Third, I assume that actors have stable preferences. Though this assumption is far from unproblematic in a more dynamic analysis of institutional emergence and change, it might nonetheless be a reasonable oversimplification in some cases. The reason for this is that although the future might be uncertain, there are many things that many actors do know: Women will still be women; small municipalities will still be small municipalities; upstream water users will still be upstream water users; and so forth. Hence though the future may be uncertain, actors are aware of that sudden and radical change in their social or economical position is unlikely. Moreover, this awareness can be the result of the "history of play" discussed earlier. Hence "social actors who seek long-term distributional advantage have substantial evidence about their future status in a community on which to base their actions" (Knight 1992:46).

Summing Up

Applying game theoretic reasoning on comparative case studies provides some interesting possibilities, but also problems. The assumptions used in this process have often been accused of being too rigid or unrealistic to leverage a rigid empirical analysis. The belief that non-formal models make less restrictive assumptions and that because of this, nonformal models have advantages over deductive models in empirical studies is nonetheless highly problematic. First of all, unspecified assumptions in alternative models can not be

empirically evaluated as the assumptions of game theoretical models can be. Although many of the assumptions of these latter models are difficult to verify empirically, presenting them explicitly at least allows for the possibility of empirical analysis. Second, when predictions of game theoretical reasoning - concerning both outcome and dynamic processes - are estimated empirically, we gain rich information about reality. This should be seen as advantage to frameworks that offer predictions about outcomes only, with no predicted dynamic structure (Morton 1999:42f).

Though game theoretical elaborations can be made using highly sophisticated formal analysis, the approach to be assumed here is different to tackle the issue at hand. As I intend to show, both valid and interesting results can be attained if basic notions of interdependent strategic action and of equilibrium outcomes are systematically introduced into our explanatory hypothesis (c.f. Scharpf 1997:7). This is the subject of the following empirical chapters.

Selection and Analysis of Interviews in Chile, Appendix 1.

Introduction: This appendix describes the selection process and describes the interview guide used in the Chilean study. The interview process can be described as a two-step process. In the first step, the intention was to get a general picture of the impact of free-market institutions on the function of CPR-institutions in water management. The interviewees in this first step are all acknowledged and well-established representatives of their respective organization. The types of experts have been three: researchers, governmental officials and NGO's. These interviews were realized during February-May 2002. In the second step, conclusions from the first preliminary study were elaborated further. In this part, interviews were made with field experts, i.e. with persons with an ample experience of peasant agriculture and conflict resolution in the field with a special emphasis on the case study presented in chapter 6. These interviews were realized during March and April 2003.

Step 1 (2001)

Questionnaire (general description):

1. For how long have you been working for [organization X]?
2. How would you summarize the social impacts of the implementation of the Chilean water market?
3. What research has been done in the area?
4. Why has so little research been done on equity aspects of the Chilean water market in the country?
5. What role do the various water user associations play in Chile?
6. How is peasant representation in these associations?
7. Why is peasant representation meagre in these associations?
8. How does this affect the tasks assumed by these associations?
9. Any studies on this particular issue?
10. Is conflict resolution affected? In what way?
11. Any concrete examples in Chile of where this had happened?

Step 2 (2004)

Questionnaire (general description):

1. Could you start by telling giving me the background to how the project in Buin started?
2. Why was this project initiated?

3. What would you say are the most important factors behind this particular water conflict?
4. Why has this conflict taken so long time to resolve?
5. Is this kind of conflict a more general or common problem in Chile?
6. Do you know of other similar cases where the water rights of poor users have been intentionally violated?
7. Do the Chilean courts have the capacity and resources necessary to solve this kind of water conflicts?
8. How do poor communities perceive the Chilean judicial system? Do poor communities have trust in the Chilean judicial system?
9. How do you think that these groups look at their possibilities at winning a judicial process in cases of water rights violations? Does this apply to peasant farmers?

Selection and Analysis of Interviews in Sweden, Appendix 2.

Introduction: This appendix describes the selection process and describes the interview guide used in the Swedish study. The selection process has been the following. Firstly, the main existing actors in the existing CPR-institutions created to manage the Rönne River were identified. This was done using meeting proceedings from the Rönne River Committee and through interviews with identified actors. These key actors consisted exclusively of representatives from various municipalities, industries and NGO's. A sample was then done to make the number of interviews manageable. The sample was made with the ambition to firstly interview actors with a long term experience of the work in the Committee and second, to avoid selection bias by choosing actors from various potential interest positions. The interviews have been made during 1999-2005. The list of actors chosen is presented in an appendix in Chapter 5.

Step 1.

Questionnaire (general description):

1. Could you please start by telling me something about yourself, and your role in the RC?
2. Why was the Rönne River Committee created?
3. Has there ever been any occasion where members in the committee have disagreed on some important issue? What was the conflict about?
4. According to you, are there any members in the committee who are more important than others for the function of the Committee?
5. Is it possible to rank the members in the committee according to their influence on important decisions in the Committee?
6. Why is x on the top of the list?
7. Why is y on the bottom of the list?
8. Is there any particular event that makes you mention x as the most important?
9. What happened then?
10. Who participated?

A second round of interviews have also been made with Environmental Chief Inspectors in the catchment area to get an overview of the water related environmental problems in the catchment area, and with key actors in the Em River Association. The questions in this case have been less structured than in the first phase. Selection has again been assumed with the ambition to interview actors with a long term experience of the work in the river area, and second to avoid selection bias by choosing actors from various potential interest positions.

Phone-interviews have in addition also been done with practically all participants in the Working Group (WG) created by the Rönne River Committee 1996 to discuss a possible change in the institutional scope. For further description, see Chapter 5.

Chapter 5

Government Failure and Water Coalitions – The Swedish Case

“§ 6

A constitution draft for the committee was presented. The following changes were decided upon: Fifth section, 4 § cut out - “and non-profit organizations. [...]”. The scope of the undertakings of the committee was discussed. B Stone [Company B, *my comment*] wanted a note to the protocol that no responsibility in addition to those presented in the draft, ought to be prescribed.” [Protocol 1, 1977]

In this chapter I present how, and why water management institutions in Sweden are affected by the fact that actors differ in their bargaining resources. More precisely, I define the players, the possible institutional solutions, the players’ preferences over these possible solutions, and the equilibrium outcome. Here I also discuss how external institutions define the actors’ bargaining resources, and fundamentally structure the interaction and hence its outcome. I conclude by showing how this interaction results in the poor management of scarce water resources.

This chapter is organized in the following way. First, I present the “traditional” version of the emergence of Swedish water management institutions. I then redefine the game in accordance with the logic presented in chapter 2, and specify what Swedish water users’ bargain about. I then present empirical data to support the argument that the creation of CPR-institutions, even within “the Shadow of the State”, is fundamentally affected by the fact that some players have a clear bargaining advantage compared to others, thereby halting the sustainable management of water resources. But let us begin with the

traditional version of how water users overcome the “Tragedy of the Commons”.

I. MANAGING SWEDISH WATER COMMONS - THE TRADITIONAL STORY

Water resources are often presented as a classical case of the “Tragedies of the Common”. One reason for this is the fact that water is a highly mobile resource that demands the cooperative effort of various users to be managed in a sustainable manner. Farmers depending on a commonly shared irrigation system, communities reliant on a commonly used lake, or users such as cities, companies and farmers dependent on a common aquifer, are just three examples of water resources in constant threat of being overexploited as a result of a social dilemma. Swedish water resources are - despite heavy state regulation and formal control - no exception.

One important reason for this is the fact that the borders of water resources (i.e. the “catchment area”) do not coincide with administrative boundaries. This ‘misfit’ between ecological and governmental borders - acknowledged in Sweden as early as in the 1950’s (SOU 1997:49ff) - creates interesting and characteristic collective action problems between various actors in Swedish water politics.

One typical problem that arises from this setting is nitrogen and phosphorous leakage from agriculture, industry and air borne pollutants. This leakage creates costly water quality problems especially in southern parts of Sweden with resulting eutrophication (i.e. algae bloom), massive death of bottom fauna, too high concentrations of nitrate in groundwater and a continuous threat of a complete death of the bay’s marine life (Wittgren et. al. 2000).

Water Management as a Prisoners’ Dilemma Game

Solving problems such as eutrophication hence rests heavily on the possibility of water users to cooperate and create stable CPR-institutions. The situation created by this administrative ‘misfit’ can easily be modeled as a prisoners’ dilemma with two or more players selecting between the options “defect” (i.e. pollute) and “cooperate” (i.e. don’t pollute). The dominant strategy for both players in the one-shot game is the Pareto sub-optimal outcome (pollute, pollute). The same dilemma appears if we analyze the provision of CPR-institutions as a public good (North 1981). In this case, the players’ can choose between the options “contribute” or “not contribute” to the creation of new CPR-institutions.

Just as described by Ostrom (1990) however, water actors in Sweden have been highly successful in overcoming the dilemma by designing CPR-institutions that coordinate the actions of the actors along river basins, and hence monitor and/or protect the quality of the resource. These voluntarily created water management institutions (in Swedish: *vattenkommittéer*, *vattenvårdsförbund*, *vattendragsgrupper* etc.) have been recognized as an important actor by Swedish authorities (SOU 2002, SOU 1997) and hence could easily be added to the number of case studies that pay a tribute to the creation of sustainable CPR-institutions. By 1993 there were over 50 associations, varying in size from managing big lakes and large rivers, to small catchments in southern Sweden. Membership in general consists of municipal government, local industry, non-governmental organizations, and others (Lundqvist 2004:36, Gustafsson 1996).

One success story to be analyzed in more detail later is the association created around the Em River in southern Sweden. This association, consisting of municipalities and various stakeholders such as industry and environmental NGO's, has managed to achieve an impressive level of collective action and institutional innovation resulting in joint projects to improve the quality of the river (Blomqvist 2003).

II. DEFINING THE ALTERNATIVE GAME

Does this story change with the Battle of the Commons game in mind? The answer is a definite yes. This observation stems from the following fact. Various studies of existing Swedish water users associations have shown that the majority of these CPR-institutions tend to assume only modest tasks in the present management of water resources (Gustafsson 1996, Norman 1997, Vattenresurs AB 2001). The problems resulting from this low activity level should not be underestimated. As discussed earlier, the successful management of water resources is highly dependent of the ability of users to coordinate their actions.

The observed variation between ambitious and unmotivated water user associations is normally explained by differences in the degree of deterioration of the resource, the financial assets available among the participating users, etc (Lundqvist 1997). In the following sections, I define the players, the institutional options, their preferences and the outcome of the game (cf. Ostrom et. al. 1994:27ff). As will be seen, the key in understanding the different scopes of ambition chosen by the actors lies in understanding the institutional choice users are facing. In other words, the claim presented in this chapter is that the problem is not a lack of financial resources, or the degree of

deterioration of the resource, but rather which players who win the distributional conflict.

The Players

One fundamental question is of course what we mean by “players”. Which users are the “herders” in the “tragedy of Swedish water commons”? The sources of pollution stem from various activities such as municipally owned water treatment plants, industry, farming activities and other diffuse polluters such as individual households. The number of players increases drastically if we add those with an interest in the resource such as fishing organizations, recreational interests, environmental NGO’s, municipalities, universities and others. How to separate the central players of the game is thus not easily done *theoretically*. Empirical studies do, however, give a clear picture of the main players (e.g. Gustafsson 1996): municipalities, county administrations (*Länsstyrelse* in Swedish), farmer organizations, environmental NGO’s, industrial interests and fishing organizations.

Some players, however, are more important than others. In Sweden, there is a long history of local governance. Municipalities, the key actors in Swedish water politics (Dobers 1997, Burström 2000), have a constitutional responsibility to attend to the common interest of their residents, and are vested with tax power for this purpose. Over the last decades the Swedish state has transferred an increasingly heavy burden of responsibilities for implementing national policies, water management not being an exception (Lundqvist 2004:29f, Dobers 1997, Burström 2000:42f). Municipalities are hence key players in Swedish water politics. Other key players are the County Administrations. These governmental bodies have the authority to issue environmental permits to large-sized plants and facilities, and have important supervisory responsibilities (Lundqvist 2004:30, SOU 1997:32). However, these governmental bodies at regional and local level can not solve water resources problems by themselves.

As researchers argue, no organization of government possesses sufficient authority, resources, and knowledge to effect the achievement of policy intentions. Instead, policies require the concerted efforts of multiple actors, all possessing significant capabilities but each dependent on multiple others to achieve policy intention and convert it into action (Bressers, O’Toole et al. 1994). This is also the case in Swedish water politics and one important reason why the range of actors involved in creating water management institutions includes more than governmental bodies.

Is there an Institutional Choice?

One important assumption in the bargaining model presented earlier, is that different institutional choices have different distributional consequences. That is, the players are not only to get together and cooperate, but also to make a decision between different equilibrium solutions with different distributional impacts to the cooperating parties. As I show in this section, this is actually the case when recognizing that the players actually have to make a choice about the *scope* of the new CPR-institutions (c.f. Snidal 1995).

There are, however, various aspects of institutional choice that could be studied. Put differently, there are alternative various possible rule configurations that could have distributional impacts, and hence could be studied. Ostrom, Gardner et. al. (1994:41f) identifies seven types of rules and rules configurations in CPR-institutions that could be varied. These rules define the positions and the number of participants who are to hold each position (i.e. position rules), rules defining how participants enter or leave these positions (i.e. boundary rules), or rules defining how benefits and costs are to be distributed among the players (i.e. payoff rules). This urges the question of why the scope has been chosen as the focus in this study. The argument is two-fold.

First, this is one varying aspect that can be observed among the various water management institutions existing today (i.e. we observe a variation on the dependent variable). The logic here is that this variation must exist to specify the explanatory power of the model (King, Keohane and Verba 1994:129ff).

Second, this is the only aspect that has obvious distributional consequences for the actors involved in Sweden. That is, the issue of scope is a matter that forces actors to seriously consider distributional aspects of institutional choice. The next section discusses why.

The Politics of Scope

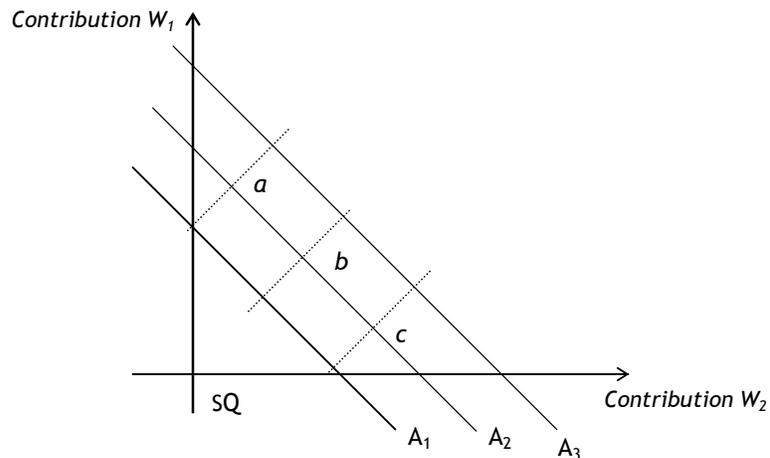
Figure 1 illustrates the argument, and shows two different water users (W1 and W2) - i.e. any combination of cooperating municipalities, industry, NGO's etc. - with the task to cooperate and create CPR-institutions to manage commonly used water resources. For simplicity, I will deal only with problems involving pairs of actors cooperating. The distributive problem emerging even in such a simplified setting is, as will be shown, quite interesting enough. The figure builds on the following theoretical and empirical assumptions:

Assumption 1: One important aspect of Swedish water politics is the fact that water users themselves have to pay for the creation and operation of such CPR-institutions (Svenskt Vatten 2002:8f). This is also

an aspect that is more general for other CPR-institutions around the globe (c.f. Ostrom 1990:15f). These costs consists of the provision of personnel, the necessary investigations to estimate the environmental impact of possible measures, the cost of actually implementing these measures to improve the quality of the resource etc.

The costs in Sweden involved in running such an organization should not be underestimated. As an example, the water related River Em Project in southern Sweden had an economic turnover of almost 15 million SEK in a three-year period, a figure that would be considerably higher if the costs for man-hours in Municipalities and County Administrative Boards and unpaid work-hours by volunteers were included (Blomqvist 2003:16).

Figure 5.1. Distributional Consequences of Water Management Cooperation



Comment: The figure shows three possible level of ambition in the creation of a new CBWUA, denoted A1/A2/A3. a, b, c shows three options in the division of the total cost between the two parties. Note that the different levels of ambition are examples of the different organizational options Swedish water users face. Also note that a, b, c are options available over all A's. SQ= Status quo. C.f. Scharpf (1997: 116-150).

Assumption 2: Another assumption is that the total costs of the new organization increases with the scope or level of ambition of the organization (i.e. A1/A2/A3). More precisely, the different ambition

alternatives A1/A2/A3 as presented in the figure, could be the following: A1: CPR-institutions are designed with the lowest possible scope and thus minimize the total cost of the organization. In the Swedish case, this means that cooperation only leads to joint monitoring of the quality of the resource. A2: Cooperating parties create CPR-institutions not only to monitor the quality of the resource, but also assume additional responsibilities with the aim of making improvements of the water resource. A3: Same as A2, but with additional responsibilities such as pilot water-quality improvement measures, and citizen involvement projects etc. This scope alternative results in a higher total cost of the organization.

Assumption 3: Another important assumption is that there is another issue to be settled through negotiations among the parties: the distribution of costs, i.e. a choice between the points a, b and c as illustrated in the figure. More precisely, an assumption is that W1 prefers a distribution of costs $c > b > a$, while W2 prefers the opposite, that is a distribution $a > b > c$. The reason for this is that each party prefers to pay less instead of more in the construction of the new organization. These costs are in general paid according to the Polluter-Pays-Principle (SOU 2002:143,208), which means that the distribution of costs should reflect how much the parties contribute to the problem.

Their Preferences

What does the simple figure imply that might be of interest for the study of collective action and the options between different equilibrium solutions? One interesting observation is that different players should differ substantially in their preferences between A1/A2/A3, depending on how much they benefit from the resulting cooperation.³ The reason for this is that different players will differ substantially in their preferences between A1/A2/A3, depending on how much they benefit from the resulting formalized cooperation. Table 1 is an example of the deduced differences in incentives among present stakeholders based on their expected benefits and costs of cooperation.

³ The fact that the parties must benefit from cooperation is crucial here. The solution would otherwise be to remain on SQ.

Table 5.1. Institutional Choice and Preferences Among Stakeholders

<i>Stakeholder</i>	<i>Benefits</i>	<i>Costs</i>	<i>Preference Order among Institutional Choices</i>
Upstream High-Polluting Municipality I	Low	High	$A1 \succ A2 \succ A3$
Upstream Low-Polluting Municipality II.	Low	Low	$A1 \sim A2 \sim A3$
Downstream High-Polluting Municipality I.	High	High	$A1 \sim A2 \sim A3$
Downstream Low-Polluting Municipality II.	High	Low	$A3 \succ A2 \succ A1$
Industry	Low	High	$A1 \succ A2 \succ A3$
Farmer's Organization	Low	High	$A1 \succ A2 \succ A3$
County Administration	High	Low	$A3 \succ A2 \succ A1$
Fishing Organizations	High	Low	$A3 \succ A2 \succ A1$
Environmental NGO's	High	Low	$A3 \succ A2 \succ A1$

Comment: The table illustrates the possible diversity of preferences for a selected number of stakeholders. “Benefits” is a rough estimate of the benefits of the creation of CPR-institutions. As an example, the reason Fishing Organizations receive a high benefit, is that its members would benefit substantially from an improvement of the quality of water. The group is however not a high polluter, which implies that their costs according to the PP-principle are low. This results in the preference order $A3 \succ A2 \succ A1$, where “ \succ ” means “preferred to”. “ \sim ” denotes “indifferent to”. The selection of stakeholders and their assumed costs and benefits should be viewed as stylized theoretical cases designed to illustrate the argument.

One consequence is that high-polluters with only modest interest in the improvement of the resource (i.e. high-polluting upstream municipalities, industry, farmer interests) have a clear incentive to keep the level of ambition down in the new organization, i.e. they prefer a level of ambition closer to A1 than to A3. The complete opposite on the other hand, applies to users whose pollution is minor, but who benefit substantially from ambitious measure programs. This includes players such as low-polluting downstream municipalities,

environmental NGO's and fishing organizations which all would reap the benefits of ambitious improvements programs, without paying the costs.

The important question at this point is how this theoretical elaboration fits into the more general bargaining model presented earlier. To do this, we must take a closer look at the different possible coalitions.

Coalitions - A Theoretical Estimate

Is there any way to predict the outcome of the distributive game? And how well does this prediction fit the empirical data? A way to simplify the analysis and hence reduce the complexity of the multi-actor interaction presented earlier, is by looking at the possible coalitions between the actors discussed earlier, i.e. to describe the game with only two players (c.f. Scharpf 1997:79f).

The outcome is thus highly dependent on the constellation of players interacting. The distributive conflict or the "Battle of the Commons Game" becomes clear if described as a conflict between two possible "grand" coalitions in Swedish water politics (see Figure 1.3., chapter 1):

Coalition 1 (C1): High-polluting municipalities (upstream and downstream), industry, and farmers' organizations. The preference order for this group is: $x + \epsilon_1 \succ x \succ \Delta_1$.

Coalition 2 (C2): County administration, fishing organizations, environmental NGO's, low-polluting down stream municipalities. The preference order for this group is: $x + \epsilon_2 \succ x \succ \Delta_2$.

As discussed earlier, this specific preference relation results in two (pure-strategy) Nash equilibrium outcomes (c.f. Knight 1992:123ff). The same applies for other constellations of actors such as industry vs. downstream municipality, upstream municipality vs. environmental NGO, upstream municipality vs. downstream municipality etc. A clear prediction is hence not possible without a proper definition of the players' breakdown values, and their possibility to *credibly commit* to their preferred alternative. These are the aspects that at the end define the outcome in the institution creating process.

III. THEORY MEETS REALITY

It should be clear at this point that the organization of Swedish water politics sets the table for a distributive battle in the creation of water management CPR-institutions. But does this imply that the

conflict is a real-world issue? In this part of the chapter I elaborate the implications of the bargaining model presented in Chapter 2, and the setting as defined by the politics and 'misfit' of Swedish water politics. I do this in three steps. In the first step, I reanalyze existing data on the relationship between scope and actor constellation. As I discussed earlier, the issue of scope should be of particular interest if we are interested in bargaining aspects of CPR-institutions. This first step gives us a rough estimate of the generality of the bargaining model. Here I also elaborate the reasons why - as will be shown - industry has a privileged bargaining position.

In the second step, I develop the argument further by analyzing one strategically chosen case of CPR-institution creation in Sweden, the so called Rönne River Committee. In the final step, I support the argument with a comparative analysis. That is, I compare the findings from the Rönne River committee with a strategically selected and successful case of water management institutions. Here I exclude possible alternative explanations.

Step I. A First Empirical Estimate

Even if the combination of players theoretically is very high, the responsibility of Swedish water resources lies in the hand of municipalities (Dobers 1997, cf. SOU 2002). In other words, municipalities are the key players interacting with others in designing water management institutions. These "others" are, as presented earlier, other government authorities such as municipalities and regional bodies, interest groups - such as farmer and environmental NGO's - and industry. Table 2 is a first empirical estimation of the equilibrium outcome of the "Battle of the Commons" game presented earlier (see appendix at the end of this chapter for methodological details of the table).

As can be observed, there is an interesting pattern in the distribution. More precisely, municipalities cooperating with industrial interests have a tendency to exclusively settle on an agreement close to A1, whereas the tendency is the complete opposite in the other cases. That is, Swedish municipalities seem to strike a bargain that is far more ambitious in terms of improvement of the resource with all other stakeholders, but not with industrial interests. This is striking considering the fact that industry is not an unimportant contributor of pollution compared to other users such as neighboring municipalities and, on some occasions, farmers.

Table 5.2. Cooperation and Actor Constellation

	Municipalities and/or regional bodies	Municipalities and other stakeholders	Municipalities and industry	Sum (N)
Only pollution measurement program and information	2	1	21	24
Pollution measurement program and water quality improving measures	9	10	2	21
Sum (N)	11	11	23	45

Comment: The table shows how the constellation of water actors affects the tasks assumed by the created CPR-institution (only pollution measurement or more ambitious with water quality improvement measures). Note that the figures only include voluntary and existing two-party water user associations. The total estimated of voluntary two-party associations in Sweden is 45. Cramer's V: 0,78. The data presented is based on a survey study conducted and presented by (Vattenresurs AB 2002). The data has been recoded with a special emphasis on the composition of interests in the association (independent variable), and the assumed activity level (dependent variable). In some cases, data has been complemented through personal contact (e-mail or phone) or official web pages. See Appendix 1 in the end of this chapter for a more detailed description of the data used.

However, the analysis of the observed “pattern” in the material rests heavily on the assumption that the separation of the independent variable “actor constellation” (i.e. columns) is theoretically valid. More precisely, it is based on the assumption that the different actor constellations presented in the table differ in their bargaining power. This urges the question of what it is that constitutes the observed pattern.

What Is It About Industry? Earlier Research

What is it about industry that makes municipalities keener on agreeing on a low level of ambition (thus giving industry a distributional advantage) compared to other forms of cooperation? Or put differently; what is it that gives industrial interests a stronger bargaining position versus municipalities than other players? These questions are crucial if we want to establish that the correlation observed is not spurious, or the result of another independent variable (Hedström and Swedberg 1998). From a non-cooperative bargaining theoretic perspective a number of circumstances *could be* presented to support the argument, and give an insight into this uniqueness of industry.

First, earlier research in Sweden indicates that cooperation between industry and municipalities builds on a highly asymmetric dependence among the parties. This analysis is based on the fact that municipalities are highly dependent of the employment opportunities and possibilities of economical development (and thus the financial benefits) provided by industrial interests. Industry, on the other hand, is also dependent on the several resources provided by municipalities such as municipal service and legal resources. One fundamental difference, however, is that an industry more easily is able to find another more cooperative municipality, than the other way around (Pierre 1992:21ff, Pettersson 2001:22). Or put differently, the option of exit is not available to local government, but easily accessible to business. Hence this might result in differences in the break-down values of the players.

Second, industrial interests have also been shown to have an important influence on decision-making in municipalities, compared to other interest groups (Pierre 1992:86ff; c.f. Uhrwing 2001). Both these aspects could be brought to the bargaining table - or are at least present in the minds of the parties - in the decision on how to design cooperation concerning water resources (c.f. Johanneson and Johansson 2000:160ff, Crenson 1971).

The argument might sound *ad hoc*, unrealistic at best and conspiratorial at worst, especially as this kind of consensus arrangement is not at all uncommon in Swedish environmental politics (Duit 2002). As discussed earlier in Chapter 2, it is inappropriate to derive results of the mechanism just by looking at the final design of the institutions. One feasible way to elaborate this relationship is by taking a closer look at the process behind the creation of CPR-institutions. This is the subject of the next section.

Step II - An Analytical Case Study

Do the differences in break-down values and hence bargaining power really explain the observed pattern? Are we to feel certain that the differences in scope - i.e. institutional choice - is not explained by other factors such as differences in financial resources, characteristics of the water resource, or the number of actors cooperating? In other words, how are we supposed to know that bargaining resources really matter?

The empirical material so far has been far too thin to support such a statement. One fruitful way to analyze the issue further is to take a closer look at the institution creating process, or at attempts to change the institutional solution chosen. Again, we need to specify the players, their preferences over institutional alternatives, and elaborate the equilibrium solution. The important question is hence how to select one such critical case. The criteria for selection applied in this chapter are the following:

First, the case should contain the constellation of actors of interest for the theoretical aims of the thesis, i.e. a combination of municipalities and industry. Second, the case should involve a case of limited scope cooperation. These two criteria assure that we analyze a case that has the values of interest on our dependent (i.e. scope) and independent variable (i.e. actor constellation). Third, water resources should be under serious ecological stress, i.e. risking destruction and overexploitation. This is to exclude the most obvious explanation to the limited scope of the CPR-institution. Fourth, and to facilitate the analysis of the incentives the actors face, there should be a sufficient amount of ecological data. The data should give us ecological information of the severity of water resource degradation, the contribution from each actor, the potential for improvement etc.⁴

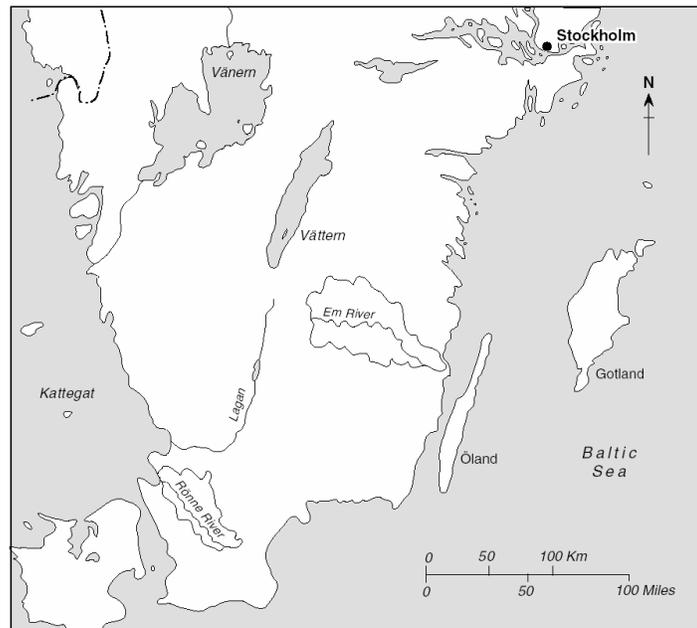
In the next part I present the result from interviews with a strategic sample of actors in one existing water user association that fulfils all the requirements presented above. As the interviewees have been guaranteed full anonymity, the names of the interviewees and the material have been recoded in the chapter. A full description of the case and its participants is presented in the next section.

⁴ This data has been provided by researchers from the Swedish Water Management Research Program (*Vattenstrategiska forskningsprogrammet*, VASTRA). The data used in this chapter rests both on hydrological models developed by the Swedish Meteorological and Hydrological Institute (SMHI), and data collected by biological consultants in the area studied.

The Case

During the last decades the Rönne River located in southern Sweden, has experienced several water related environmental problems. Flooding, periods of droughts, acidification, eutrophication, pesticide and metal pollution, and threats to biodiversity along the streams, to mention the most important ones (Survey 1, Report 1, Report 2). Eutrophication is also one of the more serious problems in the area compared to other parts of Sweden (Miljömålsrådet 2004:38ff). The sources of pollution are several and in general the result of human activity, such as diffuse pollution from agriculture and point-source pollution from municipal and industrial activities (Report 3).

Figure 5.2. The Study Areas, Southern Sweden.



The scope of the only existing CPR-institutions that could tackle these problems is despite these problems remarkably low. The only activity assumed by the Rönne River committee (RC) - created as early as in the 1970's - is water quality monitoring. More precisely, CPR-institutions are designed to organize and distribute the costs of a joint measurement program, which is the lowest level of ambition as

required by law (Gustafsson 1995). According to the interviewees, what drives cooperation in the RC is the interest to reap the financial benefits of coordinating a common monitoring program, compared to promote such program individually as required by law.

The total cost of such a program is an approximate of 400 000 Swedish *kronor* (~ 52 000 USD) yearly (Protocol 1,2,3). The sum is low compared to the measures needed to halt the degradation of valuable water resources in the area (71 million Swedish *kronor* according to Report 1). Put differently, the parties involved in the creation of the CPR-regime have decided to limit their joint activity at the lowest possible level, thereby halting the possible protection of the resource.

As several of the interviewees point out (e.g. S2, S4, S9), there have been several attempts from various actors in the area to expand the scope of the CPR-regime. The most important attempt was in 1993 when the environmental NGO in the area in one of the yearly public meetings of the Rönne River Committee, suggested a more ambitious cooperation along the river. This attempt resulted in two proposals. The first was the suggestion to carry out a more ambitious investigation that should not only include a full description of the status of water related environmental problems in the area, but also a concrete proposal of measures to achieve an improvement of the resource. The latter should also include an estimation of the costs associated by such a project, and a proposal of how to distribute the costs. This part of the proposal was realized, and the report was presented in 1995 (Report 1). The second proposal was to put together a working group of representatives from a small number of key municipalities in the area. The purpose of this group that existed between the years 1996-1998, was to find the economical resources necessary to fund the measures suggested by the report. This goal was - as will be discussed in more detail later - not realized. A closer analysis of the players and their interaction might provide important input to why this is the case.

The Players and Their Preferences

Municipalities are the key players in Swedish water politics. It is however, important to point out several differences within the group - such as that between upstream and downstream municipalities - and other groups involved in the co-management of Swedish water resources in the Rönne River Committee. One such important difference is the fact that some of the actors are considered as regular members - with the right to vote and participate in board meetings - while others are considered "interest members" with the right to participate on yearly meetings, and to receive the annual report. Table 5.3 provides a general description of the users involved in the Rönne

Table 5.3. A general description of water users in the Rönne River Committee.

Player	General description	Pollution-load (kg yr ⁻¹ per capita)
Municipality A	Downstream. Water use dominated by industry (70%). Hosts Industry A1 and Industry A2.	High (31,5)
Municipality B	Upstream. Water use dominated by industry (90%). Hosts Industry B.	High (20,9)
Municipality C	Downstream. Water use mainly domestical (48%) and farming (31%)	High (15,9)
Municipality D	Upstream. Water use mainly for domestical use (48%) and farming practices (21%).	Low (5,1)
Municipality E	Upstream. Water use for domestical use (31%), farming practices (21%), and industry (32%).	Low (4,8)
Municipality F	Upstream. Water mainly for domestic use (57%).	Low (13,9)
Municipality G	Upstream. Water mainly for domestic use (52%).	Low (4,3)
Municipality H	Upstream. Water use mainly for domestical use (37%) and farming practices (38%).	Low (8,7)
Regional Administration	Monitoring responsibility. Makes sure that the pollution monitoring program fulfills the standards set by national law.	n.a.
Industry A1	Pulp mill, important employer in Municipality A (employs 5% of the working force).	n.a.
Industry A2	Foodstuff producer, important employer in Municipality A (employs 5% of the working force in the municipality).	n.a.
Industry B	Chemistry industry, main water user in the municipality. Important employer in the municipality (employs 25% of the total workforce in the municipality).	n.a.
Environmental NGO	Activities mainly concentrated in Municipality C.	n.a.
Fishing Organization	Activities mainly concentrated in Municipality A.	n.a.

Comment: The figure shows the actors involved in the use of the River. Categorization of whether the municipality is upstream or downstream in the catchment area is based on the geographical distance to the coast. Categorization of pollution level (High or Low) is defined by the per capita (= total annual N net-load/inhabitants). Values above the annual 15 kg per capita are regarded as “high”, while values below as “low”. Figures in parentheses present the values for each municipality. **Sources:** For data on water use: *Statistiska centralbyrån* (SCB) www.scb.se - Statistikdatabasen - SCB Kartor - Miljö - Vattenanvändning (2003-05-29). For data on employment: *Kommunfakta* at <http://kfakta.saf.se> (2004-01-20). Pollution load from SMHI/VASTRA 2004.

River with a special emphasis on their pollution level, water use and geographical location (cf. earlier discussion about Figure 5.1.) One simple way to explain the fact that the activity of the committee is low could be that all, or a vast majority of the actors prefer such an alternative. As will be shown, this is not the case in the Rönne River. The following description of the preference order is based on interviews with a strategic sample of water users in the Rönne River (see appendix 2 for a description of the interviewees). All of the persons included below are key actors in the cooperation that has evolved around the Rönne River.

Assessing the preferences of actors is nonetheless far from a simple task. The reason is that actors sometimes have strong incentives to misrepresent their goals, which seriously might mislead the researcher. In short, actors in this case study might misrepresent their preferences by falsely claiming to want more ambitious cooperation.

Table 5.4. Water Actors and Institutional Preferences

Actor	Extraction from interview and material	Preference order	Alternative material
Municipality A	<p>"The problem is that all we do is to monitor and monitor, that we do not have a program to realize improvement projects."</p> <p>"It is frustrating to have a committee that only monitors, and that the measures are placed on individual municipalities."</p> <p>"We [<i>in the RC</i>] are doing it too simple for us just by measuring phosphor and nitrogen compounds."</p> <p>(S9, italics mine)</p>	$A3 \succ A2 \succ A1$	Yes, confirmed by S1
Municipality B	<p>"We in B haven't thought that much on that [<i>why the committee hasn't realized measures</i>]. Because we don't experience the problem. We are in the upper parts of the system, so we don't see it [<i>pollution problems</i>] in our municipality."</p> <p>"We will not do things [<i>measures</i>] voluntarily; we [<i>the environmental office in the municipality</i>] have savings demands."</p> <p>(S5, italics mine)</p>	$A1 \succ A2 \succ A3$	Not required

Municipality C	<p>"That is the real weakness [<i>with the committee</i>], that it is created only to coordinate monitoring. There is no room for measurements or anything."</p> <p>"There are those that say 'we have done enough monitoring, now it is time to realize measures'. But that is not allowed according to our regulations."</p> <p>(S4, italics mine)</p>	A1 - A2 - A3	Yes, S25 and S2
Municipality D	<p>"The river does not concern us much in the municipality; we are the municipality with least contact with the River. What we have is one sewage treatment plant. "</p> <p>"We have a small part in the River, so there is not much for us to gain [<i>in the case the measure plan is implemented</i>], [...]. But we can not only look at our municipality, we help each other to find a common solution."</p> <p>(S11, italic mine)</p>	A1 - A2 - A3	Yes, document*
Municipality E	<p>"We have been one of those who have put the brakes for projects at the Rönne River. We [the municipality] have had other programs in X and Y to deal with water issues there."</p> <p>"It is a matter of financial resources [...]. The X project was very large and important, and was planned to last for a long time, and it was important that we were given the time to evaluate and see if it resulted in improvements."</p> <p>(S22)</p>	A1 > A2 > A3	Not required
Municipality F	<p>"It is only a monitoring part [<i>in the RC</i>]. It should be done as they did in another project where they set aside financial resources and realized measures."</p> <p>(S10, italics mine)</p>	A3 > A2 > A1	Yes, document*
Municipality G	<p>"It is more that they [<i>the RC</i>] has looked at the [<i>monitoring</i>] results. But no measures, I have missed that part many times."</p> <p>(S26, italics mine)</p>	A3 > A2 > A1	Not possible **
Municipality H	<p>"The responsibility for measures lies obviously not on individual municipalities as the problem in general is the result of governmental agricultural policy. The state must take full responsibility and assign the required funding."</p> <p>(Document 4)</p>	A1 > A2 > A3	Not required

Regional Administration	<p>"The RC is totally focused on point-source discharges, despite the new Environmental Code [...]. And according to it, it is clear that you can deal with non-point discharges."</p>	(S3) A3 > A2 > A1	Yes, document*
	<p>"The Regional Administration looks forward with great satisfaction that this work [i.e. implementing measures] is done."</p>		
	(Document 5)		
Industry A1	<p>"We also try to explain that there is an economical reality as well. That these measures in general, not always of course, cost a lot of money. [...]. We, the industry, also tried to bring in the issue of costs in the discussions."</p>	A1 > A2 > A3	Not required
	<p>"Usually industry is not..., well, they would like to support, but there should also be a revenue, and not only costs. They are not particularly philanthropic."</p>		
	(S6)		
Industry A2	<p>"I know that I don't have the mandate, and that I wouldn't get either from the company to go for measures, beyond those that we do to minimize the discharges. As a company we think that we have done enough to fulfil that need."</p>	A1 > A2 > A3	Not required
	<p>"Are we really supposed to pay to prevent discharges from completely other sources? We do what we can and none of the industries are stingy, we think that it is up to other actors, but we are ready take part of the discussions."</p>		
	(S12)		
Industry B	<p>"I think that we have been exposed to a certain degree of persuasion to remain [in the RC] since we finance big part of the program. [...]. We could have come away somewhat cheaper."</p>	A1 > A2 > A3	Not required
	<p>"My opinion is that we do more than is required according to our undertakings in the committee."</p>		
	(S1)		
Environmental NGO	<p>"It [<i>the work in the committee</i>] has been very slow, not much has been done."</p>		
	<p>"We have made several suggestions. In 1993 we wrote a proposition of how to tackle nutrient leakage, and we suggested the creation of an environmental protection fund."</p>	A3 > A2 > A1	Yes, document *
	(S15)		

Fishing organization	<p>”They [the RC] are not a decision-making organization as several municipalities are involved. They should be able to build protection zones [<i>to prevent nutrient-leakage</i>].</p> <p>”We have been fighting for five or six years to get a fish ladder.[...] We’d expected the municipalities to show more interest since the economical resources needed are minor. I can tell you that we have been fighting a lot with that.”</p>	$A3 \succ A2 \succ A1$	Yes, S11
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(S13, italics mine)

Farmers organization	<p>”To finance a project of this sort can only be assumed with the support from society. The contribution from municipalities is fundamental, but financial support from state actors should be considered. Our sector cannot contribute financially, neither directly or indirectly [...].</p>	$A1 \succ A2 \succ A3$	Yes, S25
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(Document 6)

Comment: The table summarizes the empirical material used to assess the preference order of key actors in the Rönne River. ‘S5’ as an example, denotes the code of the interview. “ \succ ” means “preferred to”. “-” denotes “indifferent to”. * denotes that the interview has been validated with alternative empirical material. More precisely, this material consists of comments from respective actor on the official report (Report 1) dealing with the suggested modification of the tasks assumed by the Committee (i.e. a change of institutional scope). ** denotes that alternative material has not been possible to identify.

This potential problem has been tackled using indirect questions to assess the actors’ preferences. In general, the analysis below builds on the interviewees’ general description of the work done by the committee or their narratives on the existing controversy concerning the scope of water management institutions. When considered required, alternative material such as interviews with other actors or public documents has been used to validate the analysis as shown in the table.

As Table 5.4 shows, there is a difference in interest between the different actors in the catchment area that can be confirmed empirically. While some actors would like to see an increase in the scope of the CPR-institution, others prefer to keep ambitions low, despite a continued degradation of water resources in the area. This divergence in interest can easily be understood as a “Battle of the Commons” game presented in earlier chapters.

Thinking in terms of two coalitions gives us the following analysis. Let us denote the players preferring the most ambitious institutional alternatives the High Ambition Coalition (HAC), and the players

preferring the least ambitious coalition, the Low ambition Coalition (LAC). Let us also assume that the ambiguous (i.e. neither ambitious nor unmotivated) group of players is not part of any coalition. The resulting game is elaborated in figure 5.3.

Though this certainly pinpoints the actors and the alternatives they face, it does not help us very far in explaining the real-world equilibrium outcome (A1, A1). The reason for this is the fact that there are other possible equilibrium outcomes, e.g. any of the alternatives (A1,A1), (A2,A2), (A3,A3). So why did the actors settle for A1?

The final outcome should - at least according to the bargaining model - be fundamentally dependent on the breakdown values of the coalitions (Δ_{HAC} and Δ_{LAC}) and hence the preference structure of the coalitions. In other words, the fact that the creation of water management institutions has settled on a low level of ambition, and hence to the distributional advantage of the players involved in the Low Ambition Coalition - should heavily depend on the ability of the LAC players to credibly commit to their preferred institutional solution. To do this, however, we need to look beyond the preferences, analyze the breakdown-values and get into the minds of the players.

Figure 5.3. Strategic Interaction between Two Coalitions

		LAC		
		A1	A2	A3
HAC	A1	3 1	Δ_{LAC} Δ_{HAC}	Δ_{LAC} Δ_{HAC}
	A2	Δ_{LAC} Δ_{HAC}	2 2	Δ_{LAC} Δ_{HAC}
	A3	Δ_{LAC} Δ_{HAC}	Δ_{LAC} Δ_{HAC}	1 3

Comment: 3 denote the most preferred alternative, and 1 the least preferred. Δ denotes the players' breakdown values, i.e. the pay-off received in the case coordination is not achieved. Δ_{HAC} for the High Ambition Coalition (HAC), and Δ_{LAC} for the Low Ambition Coalition (LAC).

Identifying the Focal Players

What makes the HAC settle for a lower ambition level than the one they would prefer? As presented in chapter 2, one way to approach the

issue is to look at which of the players are considered “focal” in the institution-building process. In other words, on which of the players that are considered to be so important by members of the HAC that they prefer to settle on their least preferred institutional solution.⁵

Table 5.5 is a summary of semi-structured interviews made with key representatives in the RC.

Table 5.5. High Ambition Coalition ranking

<i>Ranking</i>	<i>Mun. A</i>	<i>Mun. G</i>	<i>Reg. Adm.</i>	<i>Env. NGO</i>	<i>Fishing NGO</i>	<i>Consultant</i>
1	Municipality A		Industry A1	Industry A1		Regional Administration
2	Municipality C	<i>Could not rank</i>	Industry A2	Industry A2	<i>Could not rank</i>	Municipality A
3	Municipality D		Municipality A	Industry B		Municipality C
4	Industry A1	<i>Could not rank</i>	Municipality D		<i>Could not rank</i>	Industry B
5	Industry B		Consultant			Industry A1
6	Industry A2	<i>Could not rank</i>	Industry B		<i>Could not rank</i>	Industry A2
7	Reg. Adm.		Env. NGO			
8	Farm. Org.					

Note: NB: No ranking. Interviewee chose to only point out the group.

NB: No ranking. Interviewee chose to only point out the group.

Comment: Question: How would you rank the different actors in the association according to their influence on important decisions in the Rönne River Committee?

⁵ This task is not unproblematic. As the CPR-regime was created in the late 1970's which implies that the key players have retired from their earlier positions. This chapter builds on interviews with a strategic sample of present key players. For a discussion and description, see Chapter 4.

The interviewees were asked to rank the actors in the river basin according to “their influence on important decisions in the Committee”. This question was asked to pin down the circle of actors that are viewed as crucial for cooperation and - if possible - to obtain a ranking of actors compared to each other.

As the table shows, even though some of the interviewees were not able to rank at all, there seems to be some convergence on the group of players that are crucial. *Industry A1, A2 and B in the LAC are repeatedly mentioned as having most “influence” in the existing CPR-institution.* When asked why some of the actors in the RC are more influential than others, the reasons given are that the actors are “very knowledgeable”, and that they heavily contribute to the pollution load in the river (Interview S4 and S9). The table hence gives an indication of which of the players that “matter” and have “influence” in the RC according to the actors that would prefer another more ambitious institutional solution.

Table 5.6. Low Ambition Coalition ranking

Ranking	Mun. B	Mun. H	Industry A1	Industry A2	Industry B	Farmers Org	Mun. E
1			Regional administration	Regional administration	Regional administration		Municipalities
2	<i>Refused to rank!</i>	Could not rank	Municipality A	Municipality C	Industry B	n.a.	
3			Municipality C	Municipality A	Municipality A		
4			Industry A1, A2, B	Industry B	Industry A2	n.a.	
5		Could not rank		Industry A1	Municipality D		
6				Industry A2		n.a.	
7		Could not rank					
8							

Comment: Question: How would you rank the different actors in the association according to their influence on important decisions in the River Committee?

This is however not enough if this is to be used by actors in the LAC to strategically commit to their most preferred alternative. As discussed earlier which information that is common is everything in non-cooperative games. More precisely, members of the LAC must be aware of being focal, to be able to strategically commit to A1. The next table gives us an estimate of how LAC-players position themselves, and the rest of the players according to same logic presented earlier, i.e. when asked to rank actors in the RC according to their “influence on important decisions in the Rönne River Committee”.

The question at this point is how far these two tables of influence take us. One conclusion to be drawn is that representatives from industry are the only group of players considered to be “influential”, and who know it. The question is how this “influence on important decisions” matters for the analysis of institutional choice. This is the matter of the next section.

Blocking Institutional Change

Despite the fact that institutions tend to “lock in” to an equilibrium and that solutions are “path-dependent” (Pierson 2000), any change in expectations of the players - e.g. threats to commit to A1 are not longer seen as credible - or in the decision environment such as new legislation, or a drastic worsening of water resources, might trigger attempts to institutional change from earlier disadvantaged parties. When such attempts are realized, the question of which of the players that are considered “focal” by all players becomes crucial. Knowing that the existing institutional solution heavily relies on the participation from one or a number of actors and those actors clearly signal that any change to its disadvantage is unacceptable, should efficiently block any such attempts. As will be shown, this becomes clear in interviews with the actors in the Committee.

According to the interviewees - and a matter that has been identified as the only subject that led to disagreement among the parties - there have been a number of attempts to change the institutional solution chosen by the participants in the RC. This is confirmed by both meeting proceedings and interviews (Protocol 2, 3, 4, S9, S13, S25) which indicate that this has happened on a number of occasions in the 1990's. The continued degeneration of water resources and the continued low level of ambition in the committee sparked off attempts by environmental and fishing NGO's in the river basin to propose a change in the cooperation.

As discussed earlier, the most important attempt was in 1993 when the environmental NGO in the area in one of the yearly public meetings

of the Committee, suggested a more ambitious cooperation along the River. This attempt resulted in one report that included a full description of the status of water related environmental problems in the area, but also a concrete proposal of measures to achieve an improvement of the resource. This report was presented in 1995 (Report 1). The RC also put together a working group (henceforth WG) of representatives from a small number of key municipalities in the area, and one representative from the agricultural sector. The purpose of this group - that existed a couple of years in the mid-1990's - was to coordinate their action and find the financial resources necessary to fund the measures suggested by the report. This goal was never realized.

What Happened?

The intriguing issue at this point is why the several attempts to change the scope of the CPR-institutions weren't successful. There are several reasons why this is puzzling. Firstly, water resources in the area were clearly deteriorating - a fact municipal decision-makers and other actors were aware of (Protocol 7, Report 1). Secondly, a proposal of how to deal with the problem and execute the necessary measures based on solid data was on the table. The cost to be distributed was six million Swedish *kronor* over a period of 12 years. Thirdly, everybody in the WG agreed on the necessity to implement measures, but worried about how to finance the project (Protocol 6). Forth and last, as the documents show, a full organizational structure was set up, including a political board, a working group integrating consultants and cooperation with other water management groups in the country to secure valuable input (Protocol 5).

Interviews with the participants in the WG (S2, S3, S9, S11, S23, S24, S26, S26, S28) do not give us a clear picture of why the initiative to change the scope of the CPR-institutions lost momentum. While some of the interviewees point out that the reason the WG failed to change the scope of cooperation was the lack of an organizational action plan (S2), others point out that the municipalities involved lacked the political will and financial resources to realize such an ambitious cooperation (S3, S9, S11, S23). Others claim not to remember why coordination eventually failed in the WG (S24, S26, S27, S28).

Credible Commitments - Identifying the Focal Players

The picture presented by the actors involved is hence ambiguous. Thinking in terms of actor constellations, it is interesting to note that industrial representatives never took part in the discussions of the WG

(e.g. Protocol 4), despite that the group is not only an important user of water resources, but also one of the most important polluters of water resources in the area. Why this group was not represented seems to have a simpler answer: not only did they not want to, but the other participants knew it (S11, S23, S26). The question is how this might have affected the only serious attempt to change the scope of the RC.

The expected refusal to participate in the WG indicates that industry has sent a clear signal to the other actors in the area that they refuse to participate on issues that imply an increased scope (and costs) of cooperation. This signal is not only confirmed by interviews with industrial representatives (S1, S6, S12), and an impressive number of other actors in the RC such as Chief Environmental Inspectors in municipalities in the area (S2, S3, S4, S5, S7, S8, S9, S10, S11, S23, S26), but also by meeting proceedings that date back to the very emergence of the CPR-institutions. As is clearly stated in the first meeting when the constitution of the RC was discussed in the end of the 1970's:

“§ 6. A constitution draft for the committee was presented. The following changes were decided upon: Fifth section, 4 § cut out - “and non-profit organizations. [...]. The scope of the undertakings of the committee was discussed. B Stone [Company B, *my comment*] wanted a note to the protocol that no responsibility in addition to those presented in the draft, ought to be prescribed.” [Protocol 1, 1977]

Hence, industrial interests have credibly committed to their most preferred institutional solution. One important prediction of the model that has to do with the mechanism rather than the outcome is that players with an interest of enhancing the scope of the CPR-institution are discouraged from doing so. While this does not seem to apply to NGO's in the area, it certainly seems to apply to two important Chief Environmental Inspectors.

As becomes clear in the interviews, not only do Chief Environmental Inspectors want to do more, but are unable to do so given the limitations in the CPR-institution. Industry, again, is of main interest here. As the Chief Environmental Inspector in Municipality B puts it:

Q: What is your opinion, could these companies lower their pollution level further? Or have they reached the limit...

S5: “They should be able to lower it further, yes, that is my opinion. [...] What I find most unpleasant though, personally, are all those substances that we don't know anything about.

Q: What kind of substances do you mean?

S5: Sometimes you can tell there is something in the water, but you don't have a clue what it is all about. I think that is the unpleasant thing.

Measuring nutrients and phosphor and temperature, that is pretty easy. But stable organic compounds are created, and we are not certain of what happens. Industry B has very complex water, and what happens when you mix A with B, what is the result C, and what is C?

Q: is it possible to see any effects in the ecology directly, or is it just...

S5: There are things you just don't know why. That I think is the most troublesome ("jobbiga") thing.

(S5, Municipality B)

Under the same issue, another Chief Environmental Inspector discusses water pollution problems related to industrial activities in Municipality B:

Q: Your municipality receives a large amount of pollution from upstream industrial activity. [...] Is that a big problem?

S9: No, not in the way you think it is, but it's there. It's a large industry with an extensive activity that deals with a lot of chemicals, and has always done so. Sewage treatment plants are nowadays being constructed, and larger and larger security measures to deal with that as well. And there are a lot of old debts in dams, in the mud and in the lakes surrounding the R-stream, and in the dams on the outskirts of Municipality B. It is not a problem that you think of on a daily basis. But if you look at the results [in reports, *my comment*], you can see an obvious effect.

Q: Could industrial interests upstream do more to lower their pollution levels?

S9: My spontaneous reaction when it comes to Industry A1 is, do we really have a clue about all the chemicals they deal with, and all the chemical compounds that could be part of it, what do we really know about this? It is such a complex technology that is used there, that frightens me, since it is a chemical industry.

(S9, Municipality A).

As the interviews show, both Chief Environmental Inspectors in the two municipalities that host industrial activities are worried about the impacts of chemical pollution in the river basin. This, however, has never been an issue among the cooperating parties in the River Committee (interview S3, S5, S9). This is surprising considering the fact that chemical pollution is a problem in the catchment area, and that the authority in charge of monitoring it, concludes that:

S3: Industry A1 will only change aspects of the monitoring program if they need new permit to new activities. Flame retardants and metals are important to Industry A2. We have been a little weak in looking into that. There is a lot of that stuff.

(S3, Regional Administration)

IV. EXCLUDING ALTERNATIVE EXPLANATIONS

The analysis so far has been based heavily on the model and theoretical assumptions presented in the beginning of the chapter. Important conclusions so far are that - according to the bargaining model - industry is a focal player in the sense that they are the only group that can credibly commit to their mostly preferred institutional solution. Not only have the signals been clear, and the group is considered by others as vital for the maintenance of cooperation, this also seems to be the most important reason why the protection of water resources has been halted in the area. On the other hand, there could be various *other* factors that might be able to explain the outcome (cf. Scharpf 1997:22fff). How to deal with the issue is far from uncomplicated.

The approach I will assume here is to achieve unit homogeneity through a comparative case study. In the following sections, a comparison of the RC is made with the only existing successful case (i.e. ambitious in scope) of CPR-institutions that involves both municipalities and industry in Sweden. This approach might help us exclude alternative factors that might explain the limited scope (cf. King, Keohane and Verba 1994:107f).

More precisely, the issue to be developed in this last part is the following: do the aspects of credible commitment put forward in this chapter, really explain why cooperation along the River Em is more ambitious than in the studied Rönne River Committee, or is it something else that is not captured by game theoretic reasoning? The alternative explanatory factors discussed here are: *actor constellation*, *ecological characteristics*, *financial strains* and *differences in influence*. The factors are chosen both from main-stream literature on issues of collective action and natural resource management (Ostrom 1990, Ostrom et. al. 1994) and relevant research reports (Vattenresurs AB 2001, Gustafsson 1996, Lundqvist 1995). As will be shown, none of these factors seem to provide a better explanation for our case than the bargaining model presented earlier in the chapter.

Difference in Scope?

While the RC has focused exclusive on monitoring, the Em River Committee shows an impressive activity. This is shown most clearly in the economical turnover of the cooperation (Löwgren 2001:39ff). Between 1997 and 2000 the actors along the Em River handle a total of 15 million Swedish *kronor* (e.g. 2 million USD). The projects realized by the Em stakeholders are partly co-funded by central agencies - such as the National Board of Fisheries (*Fiskeriverket*) and the European Union

- and include several measures ironically also suggested by actors, or obviously needed in the RC, but never realized due to the limited scope of the CPR-institutions. Several subprojects have been launched to improve the fish fauna and the sports fishing within the catchment, a project that also has been proposed at several occasions by the largest fishing NGO in the Rönne River (S13).

The Em River Project has also encouraged the landowners to start "watercourse groups" to tackle pollution by nutrients from their own farms and forest. 195 landowners, with 25 % of the able land, are now active in 17 watercourse groups. Each watercourse group must set a goal for decreasing the loss of nutrients to the environment during the next five years (Blomqvist 2003).

Table 5.7. Comparing the Cases

The Rönne River Committee (1977-2004)	The Em River Project (1997-2003)
<ul style="list-style-type: none"> * Annual Environmental monitoring * Status report 1995 	<ul style="list-style-type: none"> * Annual Environmental monitoring * Environmental risk classification * Water flow management plan * Projects to improve the fish fauna * Introduction of "Water Course Groups" * Inventory of the areas natural and cultural history, and restoration projects with local history organizations * GIS mapping of the catchment area * Project to investigate the implications of the EU Water Framework Directive * Biotope mapping
460 000 SKr/year (average)	2 900 000 SEK/year (average)
Sources: Official website for the Rönne River Committee, Report 1, Protocol 2, Protocol 3.	Sources: http://www.emaprojektet.h.se/Eng.htm Emåprojektet (2001), Emåprojektet (1999, 2001b, 2002, 2003) ⁶ , (S17)

Another important project initiated by the Em River Project is an investigation of water related environmental hazards in the catchment

⁶ Project reports (*verksamhetsberättelser* in Swedish) from the Em River Committee.

area. All available data for some of the heavy metals, PCB and PAH have been collected and are now accessible from one single database. Kalmar University has made a historic analysis of the flows of heavy metals, PCB and PAH during the time spans 1900-1976 (Emåprojektet 2001). Table 5.7 summarizes the difference between the activities (i.e. scope) assumed by the Rönne River Committee and the Em River Project.

Though an important part of the financial resources in the Em River Project are external (from various governmental agencies, varying from 20 to 80%), the difference in scope between the two CPR-institutions is still impressive. The important question is whether this difference can be explained by something else than the bargaining focus presented earlier.

Table 5.8. Actor Representation in the two Committees

<i>The Rönne River Committee</i>	<i>The River Em Committee</i>
1 Regional Authority	2 Regional Authorities
8 municipalities	8 municipalities
5 industry	Industry *
1 environmental NGO	1 environmental NGO
2 fishing NGO's	3 fishing NGO's
1 agricultural NGO	1 agricultural NGO
1 central agency	2 central agencies
1 consultant	1 cultural NGO
Source: Official webpage	Source: Liedberg Jönsson (2004:348)

Comment: * = industrial representative represents an *organization* of small and large industries in the river basin (*vattenförbund* in Swedish). The number of members in this organization is around 50. Source: <http://www.emans-vattenforbund.com/>

Different Actor Constellations?

One reason that actors along the Em River have managed to build more ambitious CPR-institutions could be that the constellation of interests differs substantially between the two river basins. In other words, the number and type of actors might differ in such a way that it affects the outcome. As shown in the Table 5.8, the constellation is surprisingly homogenous.

More precisely, the only difference in the constellation among the parties cooperating in the studied river basins is that the Em River includes two central agencies instead of one, and only one industrial representative. This representative, however, represents an organization that totals around 50 both small and big companies.

Different Ecological Characteristics?

According to earlier research, the characteristics of the resource at issue might have an influence on the ability of actors to coordinate their actions. In our case, a difference in ecological characteristics in the river basin might have an impact on why actors have settled on a low level of ambition (cf. Ostrom 1990:192f, Ostrom et. al. 1994:44f).

Table 5.9. Comparing Ecological Characteristics

	<i>The River Em</i>	<i>The Rönne River</i>
<i>Catchment area</i>	4 472 km ²	1 900 km ²
<i>Average water flow</i>	30 m ³ /s	25 m ³ /s
<i>Lowest water flow</i>	2 m ³ /s	1-2 m ³ /s
<i>Highest water flow</i>	270 m ³ /2	Over 100 m ³ /2
<i>Source:</i>	Report: Emåprojektet (2001): <i>Emån och människan: då - nu- sedan.</i>	Report 1: pp.10

Comments: The table shows the different ecological characteristics between the two areas.

In order for this factor to have explanatory power in our case, however, the Rönne River committee must have a more complex, or more unpredictable water system than the one in the Em river basin. This at the end might dilute the incentives to achieve an ambitious institutional solution. As the next table shows, the situation is the

complete opposite, that is, the Rönne River committee has a *smaller* river basin, and a less extreme water flow, which should make cooperative action easier than in the case of the Em river basin.

The analysis, however, does not end here. One other important ecological aspect that might seriously affect the incentives actors face to achieve a higher level of ambition is of course the seriousness of water related environmental problems. In some cases, a crisis in the ecological system might trigger institutional innovation and change (e.g. Ostrom 2000, Berkes and Folke 2002).

The question is hence whether there exist any differences between water related environmental problems in the two river basins. If the Rönne River shows only moderate levels of water related problems, this too could explain the weak activity of the cooperating parties. In order to achieve this potentially complicated comparison in a simple and comprehensive way, a survey was sent out to the Regional Administration in charge of environmental monitoring in respective areas. The two officials were asked to grade the existence and seriousness of several water related environmental problems. The survey shows that the problems in the Rönne River are considered - in most cases - *more* serious by responsible authorities, than in the Em River. This is the case for problems such as eutrophication, groundwater pollution by pesticides, threats to aquatic biodiversity, extreme oxygen deficit, and temporary water dry-outs (see appendix 3 for a more detailed presentation of the surveys).

Differences in Water Use?

One ecological aspect that also could have an impact is the type of water use among the different actors. A heavy dependence on water resources for domestic use - just as an example - might provide strong incentives for municipalities to protect and drive institutional change to a higher ambition-level. Another advantage on comparing the distribution of water use is that it provides an indicator of the importance of different sectors in the various municipalities (i.e. industrial vs. agricultural activities). The reason is that diffuse pollution from the agricultural sector is more complicated to tackle, which might affect the incentives actors face in the two areas. The following table shows the water use among municipal members in both committees.

If we look at the mean value in water use, the differences between the municipalities is minor. The only difference seems to be that municipalities in the Rönne River committee use a larger share of their water resources to agricultural activities (19,8 %), compared to municipalities at the River Em (14,4%). The difference in water use between the municipalities in the cases is hence, small.

Table 5.10. Comparing Water Use, % and Total Use in 10³ m³

<i>Municipality (The Rönne River)</i>	<i>Domestic use</i>	<i>Farming activities</i>	<i>Industrial use</i>	<i>Other</i>	<i>Volume (10³ m³ /year)</i>
Municipality A	15	15	70	2	7702
Municipality B	8	1	90	1	7325
Municipality C	48	31	4	17	4740
Municipality D	48	21	15	16	2043
Municipality E	31	22	32	15	5415
Municipality F	57	23	6	14	1671
Municipality G	52	8	16	24	1320
Municipality H	37	38	12	14	2260
<i>Mean</i>	33,8	19,8	30,6	12,9	4059
<i>Range</i>	49	37	86	23	6382
<i>Std. Deviation</i>	17,8	11,9	32,0	7,7	2584

<i>The Em River</i>					
Nässjö	48	10	17	24	3796
Eksjö	53	23	9	15	2127
Sävsjö	39	16	21	23	1664
Vetlanda	32	12	49	7	5122
Hultsfred	26	21	40	13	3974
Högsby	51	25	6	18	857
Oskarhamn	40	5	28	29	4205
Mönsterås	4	3	91	2	19851
<i>Mean</i>	36,6	14,4	32,6	16,4	5199
<i>Range</i>	49	22	85	27	18994
<i>Std. deviation</i>	16,1	8,2	27,8	9,0	6093

Comment: The table shows water use for the municipalities in the Rönne River, and in the Em River. Statistics for water user is only available for 1995. **Source:** Statistiska centralbyrån, www.scb.se - Statistikdatabasen - Miljö - Vattenuttag och vattenanvändning i Sverige - Vattenanvändning efter kommun och användargrupp- Vart femte år 1995.

Another important difference between municipalities could be how much they contribute to pollution. A group of actors that are more homogenous in terms of pollution level might have a better chance at achieving collective action (cf. Baland and Platteu 2000:160f), and hence creating CPR-institutions with a more ambitious scope. As the next table shows, this is not the case in the Em River. Just like in the Rönne River (from 3 to 29 %), the Em River has a constellation of actors that contribute very differently to pollution levels in the river (from 1 to 34 %).

Table 5.11. Contribution to nutrient pollution in the two study areas

Municipality	Total N to the Rönne River ton yr ⁻¹	%	Municipality	Tot N to the Em River ton yr ⁻¹	%
<i>Mun. C</i>	593	29	<i>Vetlanda</i>	203,5	34
<i>Mun. A</i>	490	24	<i>Eksjö</i>	123,2	21
<i>Mun. F</i>	192	9	<i>Hultsfred</i>	114	19
<i>Mun. I</i>	193	9	<i>Högsby</i>	55	9
<i>Mun. B</i>	141	7	<i>Sävsjö</i>	39,2	7
<i>Mun. E</i>	137	7	<i>Nässjö</i>	28,8	5
<i>Mun. G</i>	123	6	<i>Mönsterås</i>	22,8	4
<i>Mun. H</i>	109	5	<i>Oskarshamn</i>	3,3	1
<i>Mun. D</i>	66	3			

Comment: The table shows the contribution of nutrient contribution to the two rivers. Note that the data sources differs somewhat. In the case of the Rönne River, the nutrient load includes all human activities, whereas the data from the Em River includes agricultural activities only. **Sources:** *The Rönne River*; Report 1 and Report 3. *The Em River*; Larsson (2001:13)⁷.

Financial Strains? Comparing Taxes, Taxable Income and Unemployment

Another important aspect that has been claimed to affect the level of cooperation between municipalities, are economical factors. The “common sense” argument from stakeholders themselves and water

⁷ Larsson, Rolf (2001). Kväve och fosfor från lantbruket - miljöbelastning i Emåns vatten. Emåprojektet.

politics experts in Sweden (Gustafsson 1995, Lundqvist 1997) is that municipalities with financial problems probably are less interested in creating ambitious CPR-institutions to protect water resources. As the next sections shows, the differences between the municipalities as to their financial situation are too small to be able to explain the striking difference between the scopes of the two CPR-institutions.

Table 5.12 presents three indicators of municipal financial strain. The first -the average municipal tax - gives an indication of the economical potential of the municipality. A high percentage in municipal tax indicates a less wealthy municipality, just like the second indicator - average taxable income for municipal inhabitants. The third indicator - i.e. the unemployment rate - on the contrary, indicates a more pressured financial situation. The three indicators are often used to describe the financial situation of Swedish municipalities (e.g. SOU 2003:88, 53, 72, 355), and are possible to analyze on a longer term

Table 5.12. Comparing Financial Strains

<i>Municipality</i>	<i>Average municipal tax 1990-1999, %⁸</i>	<i>Average taxable income for municipal inhabitants, 1995-2002, SEK/inhabitant⁹</i>	<i>Unemployment average 1992-2000, %.¹⁰</i>
<i>The Rönne River</i>			
Municipality A	16,41	92 217	7,4 %
Municipality B	16,50	99 880	4,2 %
Municipality C	15,38	99 589	6,0 %
Municipality D	16,50	92 376	7,9 %
Municipality E	16,59	94 142	5,7 %
Municipality F	16,57	90 952	5,9 %
Municipality G	15,29	86 119	4,6 %
Municipality H	16,61	90 726	5,6 %
<i>Mean</i>	16,23	93 250	5,9 %
<i>Range</i>	0,56	13 761	3,70
<i>Std. Deviation</i>	1,32	4 617	1,25

⁸ Source: www.scb.se - Statistikdatabasen - Offentlig ekonomi - Kommunalskatterna - Kommunalskatteuppgifter efter region

⁹ Source: www.scb.se - Statistikdatabasen - Offentlig ekonomi - Kommunalskatterna - Skatteunderlag per invånare

¹⁰ Source: www.ams.se - Fakta - Statistik - Årsstatistik (kommuner)

<i>The Em River</i>			
Nässjö	19,37	94 710	5,6 %
Eksjö kommun	17,39	94 562	5,5 %
Sävsjö kommun	18,72	84 337	6,6 %
Vetlanda kommun	17,03	91 869	6,4 %
Hultsfreds kommun	17,34	88 639	6,7 %
Högsby kommun	17,47	82 060	6,0 %
Oskarhamns kommun	16,79	103 705	5,1 %
Mönsterås kommun	17,38	95 338	6,4 %
<i>Mean</i>	17,68	91 902	6,0 %
<i>Range</i>	2,58	21 645	1,60
<i>Std. deviation</i>	0,89	6 874	0,58

Comment: The table shows three indicators of financial status in the municipalities surrounding the Rönne River, and the Em River. The year-span 1990's is chosen, as this was the decade where measures were realized in the Em River, and institutional change was halted in the Rönne River.

thanks to official data presented by Statistics Sweden (*Statistiska centralbyrån*). As can be seen, the average municipal tax is in fact *lower*, and the average taxable income slightly *higher* for the municipalities in the Rönne River compared to the Em River case. This indicates that financial situation is *better* in the case of the Rönne River, compared to the Em River area.

V. CONCLUSIONS AND SUMMARY

Swedish water politics is despite heavy state regulation and formal central control, heavily dependent on the voluntary contribution and cooperation of water users. As discussed in the opening sections of this chapter, overcoming the 'misfit' of ecological and administrative boundaries - and hence managing water resources in a sustainable manner - require the emergence of cooperation and creation of CPR-regimes.

While the traditional story about users overcoming the "Tragedy of the Commons" could be told in the Swedish case, the bargaining model developed in the opening chapter highlights previously ignored aspects of Swedish cooperation around water resources. More precisely put, the bargaining approach undertaken here displays why the scope of water management institutions in Sweden tends to be limited.

The logic is captured by the following game (c.f. Figure 5.3. presented earlier in this chapter). Let us denote the players preferring the most ambitious institutional alternatives the High Ambition Coalition (HAC), and the players preferring the least ambitious coalition, the Low ambition Coalition (LAC). Let us also assume that the ambiguous group of players is not part of any coalition.

The interesting part of this game emerges when specifying the preference order - and hence the break-down values - of the players. In addition, it should be obvious that the HAC prefer more ambitious to less ambitious institutional solutions, i.e.

$$\text{HAC: } (A3,A3) \succ (A2,A2) \succ (A1,A1) \succ (\text{SQ})$$

empirical data from the case study disclose a preference order for the LAC that determines the outcome of the game. That is, members of the Low Ambition Coalition have the following preference order over institutional solutions;

$$\text{LAC: } (A1,A1) \succ (\text{SQ}) \succ (A2,A2) \succ (A3,A3)$$

In plain English, members of the LAC clearly prefer a non-agreement (SQ), to a scope of the CPR-institutions beyond the minimum as required by law. The game thus could be described in the following fashion.

Figure 5.4. The Outcome for Strategic Interaction Between Two Coalitions

		LAC		
		A1	A2	A3
HAC	A1	4 2 *	3 1	3 1
	A2	3 1	2 3	3 1
	A3	3 1	3 1	1 4

Comment: 4 denotes the most preferred alternative, and 1 the least preferred. ‘*’ denotes the only Nash-equilibrium in the one-shot game.

As we can deduce from the game, the only Nash-equilibrium is (A1, A1). The reason for this is that members of the LAC have the dominant

strategy, A1. That is, no matter which of the options the HAC prefers, members of the LAC are always better off choosing A1. Members of the HAC knowing this have no other option than choosing A1, as the non-agreement points are less attractive options. This might explain why Swedish water CPR-institutions tend to be so non-ambitious.

Hence, the results indicate not only that industry representatives play a key role in the design and maintenance of existing water user associations, but also that these key actors continuously promote the lowering of costs in the organization, thereby forcing the level of ambition down in the organization as a total. By this they form a crucial coalition partner to (upstream and high-polluting) municipalities with modest interest in water quality improvement measures. As the strategically selected case study by the Rönne River Committee and the comparative analysis to exclude alternative explanations shows, strategic aspects of cooperative water management have important explanatory power.

Institutions, Credibility and Bargaining Power

While the outcome might seem obvious after teasing out the preference order for the two coalitions, this should not prevent us from understanding that the outcome of the game is highly dependent on the fact that one of the players in this game has a bargaining advantage. This advantage is defined by the fact that key members of the LAC - i.e. industry - can credibly commit to their most preferred institutional solution. This credible commitment is based on the following three related circumstances:

First, the fact that there is a 'misfit' between ecological and administrative boundaries creates a situation where sustainable water management is highly dependent on the ability of actors in Swedish water politics to coordinate their actions. At the same time however, there is no incentive to industrial interests to participate and create CPR-institutions that have a scope beyond what is required by the Swedish Environmental Code. More precisely, the only current obligations to operators such as industry and municipalities (*verksamhetsutövare* in Swedish) as defined by the Environmental Code, is to participate in joint environmental monitoring activities (Strömberg 2000:22f). This is a fundamental reason why the commitment can be seen as credible.

Third, and as interviews with the actors in the Rönne River clearly shows, this is common knowledge. More precisely, industrial representatives have clearly signaled that they will not accept an agreement above the required minimum. Repeated interaction such as frequent meetings among the actors in the Committee and elsewhere gives the actors various possibilities to signal this preference to

members of the HAC. As the interviews show, members of the HAC are well-informed about this fact which results in a situation where every attempt to change the scope of the CPR-institutions is seen as fruitless. This is when we observe our equilibrium solution, and this is when CPR-institutions are “locked in” to the lowest possible scope. In other words, this is exactly how bargaining resources matter in the creation and maintenance CPR-institutions.

Why are Water Users in the Em River Ambitious?

One final and important question remains before summing up: why did actors in the Em River overcome the “lock in” of CPR-institutions experienced by actors in the Rönne River? I see two related reasons.

First, industrial representatives are less important for cooperation than in the Rönne River case. None of the actors in the Em River (S17, S18, S19, S20, S21) identified industry as an actor “with most influence on important decisions” compared to the Rönne River case.

That the Em River area is characterized by a high number of both small and medium sized industries, instead of a few large ones as in the Rönne River case (Report 4) is one *probable* reason. More precisely, the fact that one of the largest water consuming industries in the region in the Rönne River also is one major employer could make some municipalities keen on maintaining a good relation with industry representatives. Bluntly put, this international industry can more easily find another more cooperative municipality, than the other way around (Pierre 1992:21ff, Pettersson 2001:22).

Second, the preference order $\{A1 \succ A2 \succ A3\}$ seems to be another for the large water consuming industry in the Em River - i.e. the paper mill industry - as it benefits substantially from some of the projects assumed collectively. The reason is not only that this industry is downstream (and hence dependent of the cooperation and good-will of upstream users) but also that it is required by law to shut down the paper mill if water flows are too low in the Em River (S20). These facts make a low ambition commitment from this large industry non-credible as they benefit substantially from cooperating with upstream users, compared to the Rönne River where industrial representatives can pull out from cooperation without greater losses.

What About External Institutions?

As discussed in the opening chapter, my ambition was to elaborate if, and how the distributive struggle in the creation of new common pool resource institutions is molded by not only differences in bargaining resources, but also by what I call “external institutions”. In the Swedish case, the impact of external institutions to the solution of

the “Battle of the Commons Game” is more or less clear-cut. Not only is the game strictly defined by external institutions - i.e. they define the players, determines the minimum level of scope, and subdues actors to pay for the activities assumed by the CPR-institutions - but also by bringing about industry’s credibility.

The argument that external institutions are a fundamental part of defining credibility is certainly counterfactual and easiest specified with an example. Any kind of external financial sanctions to parties that refuse to participate - such as forcing non-participating parties to realize expensive investigations, or paying to a fund set aside for water improving projects - might seriously weaken the LAC bargaining advantage, hence leading to another outcome of the “Battle of the Commons” game. Another such change in incentives that could be created by external institutions is external financial relieves for all participating parties, but only if CPR-institutions are of a more ambitious scope.

Although imagination might seem as the only limiting factor in defining these possible alternative worlds and external institutions, there is some empirical evidence that supports the argument. As an example, creating government institutions that supports the credible commitment of central actors such as national agencies and ministries has been shown to fundamentally affect bargaining processes between central agencies and private interests (OECD 2003, Delmas and Teerlak 2002). External institutions hence determines both what is to be gained and lost in bargaining processes, a fact that also seems to have an impact in defining the outcome of the “Battle of the Commons” game. In other words, these institutions in the end define who gets what in the social conflict imbedded in water management institutions. Whether this holds for the Chilean case is the issue of the next chapter.

Appendix 1. Methodological Note Table 2

The data presented in Table 5.2. is based on a survey study conducted and presented by (Vattenresurs AB 2001). The data has been recoded with a special emphasis on the composition of interests in the association (independent variable), and the assumed activity level (dependent variable). In some cases, data has been complemented through personal contact (e-mail or phone) or official web pages.

The associations of theoretical interest are those created voluntarily by pairs of water users/stakeholders with the intention to manage the quality of water resources. This definition thus excludes water related associations such as *vattenförbund* (as they are created by law), *fiskevårdsförbund*, and water quality improving projects assumed by one municipality alone. This definition also excludes organizations with more than two cooperating parties. The total number of such theoretically relevant associations in Sweden thus totals 45. This is an estimate based on the findings in (Vattenresurs AB 2001).

Activity and scope - the categories are intended to show two different existing level of ambition among existing water user associations. The first category includes associations that focus mainly on monitoring the quality of the resource through a common measurement program (c.f. A1 in Figure 1). The results are often presented in a yearly report. The second category includes associations that assume additional tasks, such as actually implementing measurements to improve the quality of the resource and initiating public participation projects etc. (c.f. A2/A3 in Figure 1). Unfortunately, no data is available in the material on the distribution of costs (c.f. a, b, c in Figure 1.)

Actors - the categories show three different types of actor constellations. The first category includes CPR-institutions created by municipalities cooperating with each other and/or regional authorities (i.e. *Länsstyrelsen*). Unfortunately, information of whether the cooperating municipalities are upstream or downstream is not available. Municipally owned companies are coded as municipalities, and not as an industrial interest. The second includes those associations created by municipalities and stakeholders such as NGO's, farmer's organizations, universities etc. The third includes municipalities cooperating with industrial interests. The reason to the separation between industry and other stakeholders is theoretically motivated from a bargaining perspective. *That is, it rests on the assumption that the different stakeholders possess different bargaining resources.*

Cramer's V: The chi-square based Cramer's V has been calculated to 0,78 and is used as the data available is at nominal scale. This gives us an estimate of the possibility that the distribution among the cases in the table could have occurred by chance (i.e. 22% probability).

Appendix 2. Interviews in Sweden

Idnr.	Name	Description
S1	Anonymous	Environmental Chief Industry B
S2	Anonymous	Consultant, working with environmental monitoring for the RC since the 1980's.
S3	Anonymous	Regional Authority
S4	Anonymous	Politician Municipality C, president of the RC for several years in the 90's
S5	Anonymous	Environmental Chief Inspector, Municipality B
S6	Anonymous	Environmental Chief Industry A1
S7	<i>Anonymous</i>	Environmental Chief Inspector, Municipality C
S8	<i>Anonymous</i>	Environmental Chief Inspector Municipality G
S9	<i>Anonymous</i>	Environmental Chief Inspector, Municipality A, secretary in the RC since the 1990's.
S10	<i>Anonymous</i>	Environmental Chief Inspector, Municipality F.
S11	<i>Anonymous</i>	Politician and president of the Environmental Board, Municipality D. Member of the Board of Directors in the RC.
S12	<i>Anonymous</i>	Environmental Chief Industry A2. Member of the Board of Directors in the RC.
S13	<i>Anonymous</i>	Representative Fishing NGO. Has followed the work of the RC since the 1990's.
S14	<i>Anonymous</i>	Representative for environmental NGO active in the Rönne River area. Has followed the activities of the RC since 1978
S17	Bodil Liedberg Jönsson	Secretary and coordinator in the Em River Project since the start.
S18	Jonas Erlandsson	Municipality representative, Högsby Municipality
S19	Stefan Svenaeus	Representative for Regional Authority in Kalmar. In the Em River Project since the 1990's.

S20	Jan Eklund	Metsä-Serla (paper mill industry), member in the Em River Project since the 1990's.
S21	Uno Björkman	Environmental NGO representative. Active in the work of the Em River project since the mid 1990's.
S22	Anonymous	Politician and municipal representative, Municipality E. Member of the RC from the mid 1990's to 2001. Participated in the WG.
S23	Anonymous	Politician Municipality C. President of the Working Group in the RC.
S24	Anonymous	Politician Municipality A. Member of the Working Group in the RC.
S25	Anonymous	Politician and municipal representative in the RC Municipality F.
S26	Anonymous	Politician Municipality G. Member of the Working Group in the RC.
S27	Anonymous	Politician Municipality B. Member of the RC in the 80's, and member of the Working Group in the RC.
S28	Anonymous	Earlier Environmental Inspector Municipality H. Member of the Working Group in the RC.
S29	Anonymous	Environmental Chief Inspector, Municipality H.

Appendix 3. A Comparison of Water Related Environmental Problems

Author's comment: This appendix is a translation of a survey sent out to the responsible environmental experts at the Regional authorities monitoring environmental issues in the Rönne River and the Em River catchment areas. Experts were asked to grade a number of water related environmental problems in the catchment areas respectively. The problems presented in the survey have been developed with help from participants in the Swedish Water Management Research program (VASTRA), Anna Jöborn (Ph.D. Biology) and Annika Ståhl-Delbanco (Ph.D. Limnology)

-----Start Letter-----

Mapping of water related environmental problems in the Rönne River (the Em River)

In the end of this document you will find a list of water related environmental problems. We would like you make an estimate of the severeness of problems in the catchment area using the scale presented below. Your estimation will be compared with the estimate of other representatives in Regional Authorities to get a simple estimate of how much water related environmental problems differ in the country. The scale is the following:

Scale	Explanation
1	No, not a problem at all in the catchment area
2	Yes, but only a minor problem in the catchment area
3	Yes, a problem in the catchment area
4	Yes, a big problem in the catchment area
5	Basic data missing/do not know

Please use the scale to assess the seriousness of the following water related environmental problems.

-----End Letter-----

<i>Nr.</i>	<i>Water related problem</i>	<i>Assessment in Em River</i>	<i>Assessment in Rönne River</i>
1.	<i>Floods</i>	4	3
2.	<i>Low water flows</i>	3	4
3.	<i>Acidification in lakes</i>	1	2
4.	<i>Threat to biological diversity</i>	2	3
5.	<i>Heavy metals in:</i> i. lakes	4	1
	ii. streams	3	3
6.	<i>Eutrophication in:</i> i. Lakes	2	4
	ii. Coastal waters	3	4
7.	<i>Other pollutants in:</i> i. Lakes	5	3/5
	ii. Streams	5	3/5
8.	<i>Extreme oxygen deficit ni:</i> i. Lakes	2	3
	ii. Coastal waters	2	4

9.	<i>Existence in groundwater</i>		
	i. Pesticides	5	3/5
	ii. Heightened levels of nitrates	3	3/5
	iii. Acidification	4	2
11.	<i>Problems with bathing-water quality</i>	1	3
12.	<i>Other</i>		

Chapter 6

Privatizing the Commons – The Politics of Water Markets in Chile

Chile is in many senses the “black sheep” of international water policy. While most governments have chosen to secure the quantity and quality of scarce water resources through more or less tight government control, Chile has chosen the complete opposite path; privatization of both water-supply, and water resources themselves.

As discussed earlier, privatization has often been proposed as one way to tackle the “Tragedy of the Commons”. What is interesting to note however, is that privatization far from diminishes the need of creating local and less formalized CPR-institutions. On the contrary, the creation of water markets in Chile relies heavily on the capacity of water users such as industrial farmers, peasant communities and other actors to cooperate and maintain robust institutions. This fact provides an interesting case for the ambition of the thesis to elaborate the impact of external institutions on the distributional impacts of water management institutions.

This chapter is organized in four parts. In the first part, I present the institutional context for Chilean water politics. In the second part, I discuss the role local CPR-institutions play in the governance Chilean water resources. Here I also analyze the distributional impacts of institutional choice relating to water management CPR-institutions. In the third part, I clarify some implications from the mentioned analysis, and try to evaluate them against empirical material. The fifth part summarizes the findings.

I. PRIVATIZING THE COMMONS

The introduction of a new water act in Mexico 1994; the outsourcing of municipal water-supply management in Jakarta to Lyonnaise de Eaux, a French multinational; the introduction of water markets in Chile; and the introduction of private partnerships in rural water-resources development and supply in South Africa. All these are examples of one widely discussed and applied solution to the increasing scarcity of water resources in developing countries in the face of failure of state

management; to treat water resources as a private economic good (Bjornlund and McKay 2002, Bakker 2002:769, Haughton 2002).

It is said that the creation of a free water market provides incentives to water users that increase both economic and environmental efficiency by allocating resources to their most valuable uses. The overall argument is that legal rules and institutions should favor the operation of market mechanisms, such as private bargaining and exchange, and should minimize government regulations (e.g. Anderson and Leal 1991, Smith 1995, Winpenny 1994). According to its proponents, another potential benefit is that the creation of a water market would help to reduce costly public infrastructure investment and create the right incentives to foster private investment in irrigation and water supply systems (Easter and Hearne 1993, Spulber and Sabbaghi 1998).

The key word to understand the logic behind water markets is "incentive", i.e. "the positive and negative changes in outcomes that individuals perceive as likely to result from particular actions taken within a set of rules in a particular physical and social context" (Ostrom, et. al. 1993:8f). In the case of water markets, if a water user values the water less than it is valued by the market (i.e. potential buyers), then the user will be induced to sell the water. And if a water user sees a potential economic benefit in using water more efficiently through the investment in new technology, the existence of a market gives him/her the right incentive to do so without governmental involvement. The analogy with energy provides a good example for what is expected to happen in the water sector after a privatization. Until the 1970s the low price of oil produced the same kind of distortions as those seen in the water sector, namely inefficiency and waste. The increases in oil prices during the 1970s set in motion structural changes leading to economies in energy use. The contemporary moves in a number of countries such as the U.S. to mandate power utilities to conserve rather than sell power, is a possible model for what could happen in the water sector (from Winpenny 1994:19f).

Water Privatization in Chile

Despite of the potential benefits that are attributed to a system of tradable water rights, few countries have implemented such a legal institution. One key issue is the difficulty of establishing private rights for interconnected ecological resources. That is, even if private rights are unitized, quantified and saleable, the resource system is still likely to be owned in common rather than individually. This implies that an enforcement of a market sometimes would require as large a bureaucracy as if the resource had been centralized in the first place.

Moreover, there is no guarantee that rationality would call for a private owner of an environmental good to preserve it or use it sustainably. When the price is right, the risk is obvious that many would not think twice about clear-cutting a forest, exhausting an aquifer, or using the environment as a dumping ground, if all they ever care about is the monetary gain (Chang 1989:639, c.f. Sproule-Jones 1982). Furthermore, privatizing water resources is far from an uncontroversial political issue. On the contrary, privatization initiatives from e.g. the World Bank have sparked off wide NGO activity and resistance in various countries (e.g. FOE 2005).

Chile however, remains the international leading example of free market water policies taken to its extreme, and has become something of a model for other Latin American countries - like Bolivia, Nicaragua and Peru - that are in the process of creating new water regimes (Dourojeanni and Jouravlev 1999:8, Bauer 2005:26).

In 1981 the military government - at that time heavily inspired by the neo-liberal economic theory usually denoted the Chicago School - dictated a new Water Code that completely transformed the country's system of water rights, and "swung the pendulum away" from the politics of the 1967 Agrarian Reform Law that greatly expanded state authority over water use (Bauer 1998:33). In 1969, all surface water and groundwater were declared state property. Although the state continued to grant concessions to private parties, it could, at any time, terminate a concession without compensating the private concessionaire. The concessions could be neither transferred nor sold to another private party (Simpson and Ringskog 1997:39, Bauer 1998:11ff, Ríos Brehm and Quiroz 1995).

The new Water Code on the other hand, created the necessary elements for a market: it fortified private property, introduced market mechanisms and incentives and considerably limited the state's power to regulate. The Code follows the institutional structure of the 1980 Constitution, and just like the Constitution it was written and approved while neo-liberal ideas within the military regime was at its peak (Bauer 1998:33). The core of the Chilean approach to treating water as an economic good, as presented in the Water Code, is (from Ríos Brehm and Quiroz 1995:2):

- Water rights are completely separated from land rights and can be freely transferred, sold and bought. Their private property status is strengthened and warranted based on the property laws of the Civil Code. This grants the water rights not only legal, but also constitutional, protection.
- Application for new water rights is not conditional on the type of use, and there is no governmental priority list for different uses of water.

- Water rights has been allocated by the State with no charge, and in the case of simultaneous requests for the same water rights, these are allocated to the best bid.
- The role of the State in resolving conflicts is very limited, and relies on private negotiations within the different water user associations and the judicial system. This fact will prove crucial in the later analysis.

The Chilean Water Market 20 Years Later

So what can be said about the water market in Chile after more than 20 years? Unfortunately, the lack of systematic empirical studies of the effects of an internationally well-known reform that has been in function for more than two decades is obvious for any researcher (e.g. Bauer 1998, Galaz 2004, Bauer 2005:74f). The research that does exist however, reveal mixed results. Among the positive effects of the market we find the following:

- The ample protection of water rights has lead to “significant” investment in the improvement of water infrastructure to make a more efficient exploitation possible (Dourojeanni and Jouravlev 2002:2, Rosegrant and Gazmuri 1994:33).
- The leasing of water rights has played an important roll in agriculture in times of droughts in a few regions in Chile. This implies that water actually has been allocated from low-valued activities to more high-valued ones. This market mechanism has been found in the Elqui and Limarí valleys in northern Chile with, according to investigators, substantial gains-from-trade (Hearne and Easter 1995, Hadjigeorgalis 2002).
- The market has resulted in transfers of water rights from agriculture to urban water companies. These transfers would have been much more complicated and costly in a water regime characterized by a centralized administrative system (Dourojeanni and Jouravlev 2002: 2ff, Rosegrant and Gazmuri 1994:33).

An important note here is that the actual transfer of water rights - or the actual existence of a water market as some would prefer to put it - has been extremely limited in the country as a whole (Dourojeanni and Jouravlev 1999:31ff, Bauer 1998, Hearne and Easter 1995). An estimation of these transfers shows that only 5% of the water rights in regions with high water scarcity, have been subject to an actual market transfer (Dourojeanni and Jouravlev 2002:4). Despite this low

activity in the market, problems attached to the water market have been an important political issue.

First of all, the expected increase in water efficiency in agriculture - the major water user in the country - has not been as large as it was expected. Chilean agriculture is still dominated by low water-efficiency that has to be dealt with if future demands are to be met (Dourojeanni and Jouravlev 2002).

Second, serious conflicts have emerged between the so-called consumptive and non-consumptive uses of water. At first, it was thought that the two uses would not conflict with one another because non-consumptive users (e.g. hydro-electrical industries) were obliged to replenish the water after using it. In practice, a clear conflict exists and has worked to the disadvantage of consumptive users downstream of the upstream non-consumptive users. The major non-consumptive use of water is to generate hydroelectric energy. Invariably, the water reservoirs are not filled in such a fashion as to ensure that downstream uses are unaffected. For example, consumptive users located downstream could lay claim to water trapped by reservoirs during the dry season, so the timing of use has created conflicts that have resulted in complex judicial processes (Bauer 1998).

Third, the way in which water rights have been allocated by the Chilean State - that is, without any charge whatsoever nor the need to motivate the use of the new right to governmental agencies - has led to a troubling speculation with water rights. These often unused water rights are felt to block new development involving other uses, both non-consumptive (such as hydro-electricity) and consumptive (such as small agriculture). This has been viewed as speculation in water rights because the unused water rights were captured and registered free of charge and without any commitment to use the water in the foreseeable future and without a beneficial-use test (Bauer 2005). This speculation has affected small agriculture, and especially various indigenous groups in Chile. This problem has led to modifications of the Water Code to impose a tax on unused water rights however with some important exceptions, (*La Tercera* 2005-03-16, *Chileriego* 2000b), and the creation of the governmental agency *Corporación Nacional de Desarrollo Indígena* (CONADI), with the responsibility of promoting the interests of indigenous communities (Dourojeanni and Jouravlev 1999:19ff).

Fourth, the lack of integration of environmental aspects in the creation of the Water Code is obvious, and has led to other so called "third party effects". Efforts to safeguard the flora and fauna downstream of the reservoir, just as an example, have suffered due to the fact that a river carries less water during the dry season also implies that less water is available to dilute pollution downstream of the reservoir (Dourojeanni and Jouravlev 1999:46ff).

II. GOVERNING PRIVATIZED WATERS - WATER USER ASSOCIATIONS AND DISTRIBUTIONAL CONFLICT

Even though the Chilean approach to existing and emerging freshwater problems is heavily dependent on free market solutions, various sorts of water user associations play a key role in maintaining the same market. The reason is that while water markets set the institutional context, the distribution of water resources, monitoring activities and conflict resolution, is mainly done by water users themselves. Chilean water users have a long history that dates back to the 19th century to deal with these rather typical collective action problems (Figueroa del Rio 1995:99ff, Sepúlveda and Sabatini 1997:239), and hence are recognized as the most important water conflict resolution institution in Chile (Figueroa del Rio 1995:100f, *El Mercurio* 2001).

Their tasks are numerous, i.e. to distribute water and enforce its correct use by its members, and to collect fees for construction, maintenance and administration of irrigation infrastructure. Three different types of associations are considered in the Water Code: the '*juntas de vigilancia*' (vigilance committees), '*asociaciones de canalistas*' (canal associations) and '*comunidades de aguas*' (water communities). These different kind of have different functions, with the vigilance committees as the association with most ample functions (Figueroa del Rio 1995:100f, 119fff). The vigilance committees are federations of canal associations along a shared river. The purpose of these committees is to manage the distribution of water from the river to the head of each canal (Bauer 2005:99).

Water, Institutions and Distributional Conflict

The intention of the Chilean Water Code was primarily to stabilize the water rights situation within the agricultural sector, and to ascertain a legal framework that allowed the free trading of water rights both within the agricultural sector, and from one economic sector to the other (Bauer 1998:34ff, Bauer 2005:98). As a result, resolving water conflicts in Chile depends primarily on voluntary private bargaining among irrigators (Galaz 2004), which according to economic theory (i.e. the Coase theorem), should lead to economic efficiency (e.g. Dinar et. al. 1997). Conflicts involving nonagricultural water users however, fall outside the jurisdiction of the canal associations and go directly to the regional appellate courts (Bauer 2005:98f). No government agency has authority to intervene in water conflicts. As a result, when private bargaining fails, the disputants have no other option than to go to the judicial system (Bauer 2005:98f, Galaz 2004).

Figure 6.1. The study area, Metropolitan Region (RM), Chile.



Comment: Map over Chile. The case study area in the following chapters is located in the Metropolitan region (RM). Roman numerals denote the different regions in the country.

The institutional context in this case is interesting for a number of reasons. It is interesting to note that the free market approach to water management not only relies on market mechanisms, but also rather on the willingness and capacity of water users to voluntarily solve sometimes complex water conflicts. The reason is that even if private rights are unitized, quantified and saleable, the resource system is still likely to be owned in common rather than individually.

As a result, although the Chilean water market relies on a highly formalistic and technical Water Code (Bauer 1998:23), its actual implementation is fundamentally dependent on the social norms and institutions evolving among water users in the field. This paradox creates a potential distributional conflict in institutional choice concerning the ways in which water conflicts are resolved. Consider the following and very simple one-shot two player game (c.f. Kilgour and Zagare 1991).

Figure 6.2. Water Markets and Conflict

		Player B	
		C	D
Player A	C	Status quo	Advantage B
	D	Advantage A	Conflict

Comment: The figure shows the available strategies and outcomes of water users A (Player A) and water user B (Player B). The strategies for both players are “Cooperate” (retain status quo) or “Defect” (challenge status quo by polluting, deviating or extracting more water).

Figure 1 illustrates two groups or individual water users, A and B. A and B could be any combination of water users. More specifically, the two could be individual and/or groups of irrigators, indigenous communities, an urban water and sanitation company, a hydroelectric company, industrial forestry or even any other economic agent (i.e. not necessarily a *de facto* user of water resources). Ideally, neither of these two actors extracts more water than specified by their acknowledged water rights. Hence, the users are dependent on each

other's cooperation for the maintenance of the status quo division of water resources, and for maintaining the logic of water markets.

The critical question is: what happens if someone breaks this agreement? As discussed earlier, and according to the Chilean Water Code, those negatively affected have two options: 1) take this violation to the appropriate water user association, or 2) take the case to court (Vergara Blanco 1998:271). This response from the affected thereby creates a conflict to be resolved at one of the mentioned arenas.

Hence, in this simple game each player has two strategies available: cooperate (C) or defect (D). This means that if player A chooses to defect, and player B to cooperate, the outcome of the game is (DC), the lower left box in the square. Possible outcomes of this game are thus:

CC: Cooperate, that is, to continue to divide the water according to the acknowledged status quo division of water rights.

DC: Advantage to A, that is, A extracts more water and B accepts the violation.

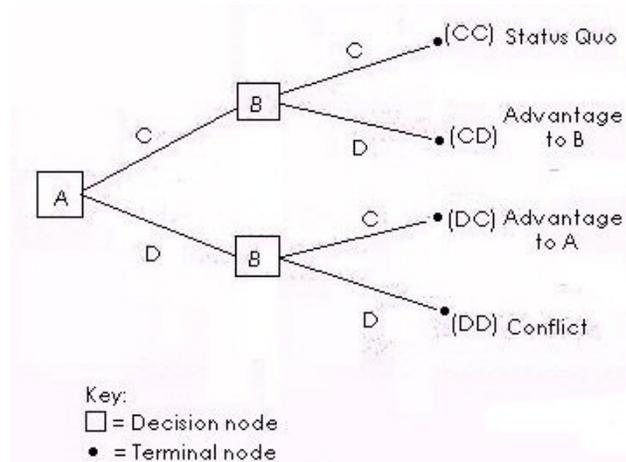
CD: Advantage to B, that is, B extracts more water and A accepts the violation.

DD: Conflict, violation by A or B is settled in either Water User Association or Court.

The status quo division of water for A (Q_A) and B (Q_B) could be anything from $Q_{A,B} = 0, 1, 2, 3...n$ liters/second. Briefly put, there is always a possibility for any of the players to defect from the status quo by polluting, deviating or using more water. The water user affected can either accept the violation outcome (CD, or DC), or take this violation to be resolved at the existing Water User Association or making a court appeal (D, D). Another way to illustrate the distributional problem that water users face is in extensive form. In this version, one of the actors is provided with a first mover advantage. This version is better able to illustrate the fact that some of the actors are upstream and hence make the first "move".

Worth repeating is the fact that the outcome of this game is heavily dependent not only on the preference structure of the players, but also on how water users design and maintain their CPR-institutions. As will be discussed further below, these two aspects are likely to interact considerably and have an important impact on the outcome of the "Battle of the Commons" game.

Figure 6.3. Extensive form water market game with perfect information



Comment: The figure is read from the left and shows available outcomes and strategies in a water market. A and B represent water users or agents. A makes the first choice. B then has the possibility of either accept the violation (DC), or challenge it in a WUA or court (DD). Remade from [\(Kilgour and Zagare 1991\)](#).

The Actors

As discussed earlier, the Chilean Water Code was designed with the purpose to stabilize the water rights situation within the agricultural sector. This sector has made an outstanding contribution to Chile's impressive growth rate of 6-7% a year during the 1990's. Since 1985, agricultural trade has been consistently in surplus, currently to the amount of about \$1.3 billion USD a year (*The Economist*, 1998). That is a huge change from the days where trade was in chronic deficit (Chonchol 1996:379ff). This high-tech and internationally competitive industry lives side-by-side with more traditional - and substantially less capital intensive - peasant farmers (e.g. Bahamondes 2003). This highly heterogeneous social context with actors differing considerable in economic and (as will be discussed) social resources provides an interesting possibility to elaborate the issues at hand in this thesis. More precisely, an analysis with emphasis on the Chilean *campesino*

community provides a critical case for the study of power and distributional conflict in water institutions.

The Chilean Campesino Community

The Chilean *campesinos* are a highly heterogeneous group - including both traditional farmers, farmers from the days of the Allende government's Land Reform in the 1970's, and various indigenous groups - but with one important thing in common. These small producers use mainly the labour force from their family, and produce mainly to secure their income (Gómez and Echeñique 1988:203ff, CEPAL et. al. 1998:22). This makes the *campesino* community particularly dependent on agriculture, and a certain availability of water, for their survival (World Bank 1995:35). As Table 6.1 shows, the number of members of the *campesino* community sums up to about 225 000 persons. As for the group's income, estimates by the World Bank show that the large majority of the group has a total annual income below \$490 USD (Table 6.2).

Table 6.1. Number of farmers, land distribution and commercialized production in Chile.

	<i>Number of farmers</i>	<i>Territorial extension (%)</i>	<i>Commercialised production(%)</i>
Industrial agriculture	35 000	61	74
Small agriculture	125 000	37	26
"Minifundistas"	100 000	2	1

Source: (World Bank 1995:35).

Comment: 'Minifundistas', a category included in the *campesino* group, is mainly a characterization of small farmers with very limited access to high-quality land. A high concentration of 'minifundistas' usually also means a high concentration of extreme poverty (Gomez and Echeñique 1988:208f).

It is also common knowledge among experts that members of the *campesino* communities seldom enjoy full legal protection of their water resources (Bauer 1998:67, Ministerio de Agricultura et. al. 1995:115-6, C3, C1). This doesn't mean, however, that these communities do not have water rights that, in theory, are protected by law. This paradoxical situation appears because the Water Code makes a distinction between recognized and regularized water rights. The former refer to water rights historically used by anyone (for example

for irrigation) from April 1979; the latter refers to water rights registered in an administrative process. Both rights benefit from the same legal protection as established by the Chilean Water Code (Vergara Blanco 1998: 322,327-31).

Table 6.2. Total annual income of Chilean *campesino* agriculture.

<i>% of small producers</i>	<i>Annual income per capita</i>
65	< 490 USD
30	491- 865 USD
5	866 - 1 940 USD

Source: (World Bank 1995:38).

Comment: The minimum wage as of December 31, 2001 was approximately \$157 (105 000 pesos) net of deductions per month. This wage is designed to serve as the starting wage for an unskilled single worker entering the labour force. (Source ERI 2003).

III. BARGAINING IN CHILEAN WATER COMMONS

Peasant communities seem to be a group likely to have a weak bargaining position, at least in theory. Surprisingly enough however, the dominant history in the international debate concerning the Chilean water regime has been a story of triumph. The successes of the new Water Code have been widely acclaimed by (Hearne and Easter 1995), (Rosegrant and Gazmuri 1994) and (Ríos Brehm and Quiroz 1995). Despite the substantial lack of empirical studies on equity aspects of the water market (Dourojeanni and Jouravlev 1999:20, Bjornlund and McKay 2002:770), both international experts and Chilean governmental officials tend either to overlook the issue (e.g. Hearne and Easter 1995, Briscoe et. al. 1998, Simpson and Ringskog 1997:42f, Thobani 1998), or to claim that these consequences have been insignificant due to the low number of transactions (e.g. Rosegrant and Gazmuri 1994:32, Ríos Brehm and Quiroz 1995). As World Bank economists Monica Ríos Brehm and Jorge Quiroz write:

Even though some specific equity problems might be involved with the initial implementation of a private water right market, it seems to be a non issue in the case of Chile given the traditional operation of a water market among farmers (and previous to the Water Code of 1981). (Ríos Brehm and Quiroz 1995:27).

A fact worth mentioning is that the market on some occasions has been shown to empower underprivileged groups. In northern Chile, water rights have provided small farmers with alternative sources of income in time of droughts, or as an economic resource in times of financial problems. This is done through a temporary and informal transfer of the right to use water (Bjornlund and McKay 2002:771). Indigenous communities with water rights in the Chilean north have also managed to bargain a beneficial contract with a mining company (Castro 1992). These transactions would have been impossible in a non-market water regime, which clearly gives the impression that the implementation of the Chilean water market has worked efficiently and even been beneficial to underprivileged groups.

Taking External Institutions Seriously

As interviews with experts, representatives from academia, government officials and additional empirical material disclose however, there are good reasons to question this view. The main cause is that the optimistic analysis presented above builds on a rather narrow and formalistic view of how markets operate.

There simply is more at stake than externalities created by the direct transfers in a water market (Galaz 2004). The emergence of a market does not only include the presence of market transactions, but also the emergence of organizations and regulations to facilitate these transfers. These market institutions will change the incentives and constraints that natural resource users face, and hence alter the behavior of existing actors and even trigger the sometimes unexpected behavior of new ones (Ostrom et. al. 1993:8ff). In other words, if natural resource users are assumed to be rational and pursue their self-interest, it is highly reasonable to assume that a change in the institutional environment will result in changes of behavior not only within, but also outside the marketplace (c.f. Baland and Platteau 1996:42). An examination of the impacts of the Chilean water regime that does not include the full array of incentives created by external institutions is partial at best and biased at worst. Peasant communities are crucial in this context and provide an illuminating example of the difference external institutions make.

Power and Conflict Resolution in Chilean WUA:s

Consider a case where one of the players defects in Figure 6.2. above. Peasant communities have either the option to challenge the defection (outcome DD), or to accept the defection hence giving the other actor a distributional advantage (outcome DC).

This defection can in the first instance be challenged in the existing water user association. Despite their importance, there are a number of recognized problems with these associations. First, despite that there are a number of well-functioning WUA:s in the country (Hadjigeorgalis 2002), all Chilean WUA's are far from being as professional as they need to be for the resolution of conflicts. An unknown number of these organizations are run by the same family for decades, and these are not always informed of the number of water users they are supposed to monitor in the river basin (INDAP 1997, Comisión Nacional de Riego 2003). Studies made by the Directorate of Hydrological Works (*Dirección de Obras Hidráulicas*, DOH) and the National Commission for Irrigation (*Comisión Nacional de Riego*, CNR), also shows that many of these organizations lack both the legal and technical capacity needed to solve water resource conflicts (Puig 1998, Comisión Nacional de Riego 2003).

Second, even if the number of formalized water user associations in Chile usually is claimed to be "high", there is an unknown number of unorganized water users. The estimate of the number of water users, and thereby hydrological entities, that do not have a WUA is practically impossible to make (C7, C8). Considering the fact that a big number of water users in Chile don't have regularized water rights - a legal requisition to be a member of a water user association - implies that the number of unorganized water user is considerable. The Chilean government has realized a number of projects to tackle both these problem (e.g. Ríos Brehm and Quiroz 1995:26, Comisión Nacional de Riego 2003).

Furthermore, even if competent and formalized WUA's do exist and the legal possibility of membership is recognized by the Water Code, it seems like *campesinos* seldom have access to them either because they don't tend to be *de facto* members in them, or - if they are - have a very low trust in how these institutions represent their interests (Sepúlveda and Sabatini 1997). This lost trust in existing associations is confirmed by government officials with extensive experience of water related peasant community development projects (C1, C3, C8, C9, C12, C16).

Part of the explanation of why this is the case seems to lie in the way in which these institutions are designed. According to the Water Code, the actors voting power is defined by the number of water rights, i.e. one vote per water right. This has been argued to marginalize *campesinos* from executing their rights in them (ODEPA 1994:37).

Another reason seems to be history. The distribution of irrigation water historically, has seldom been to the benefit of *campesinos*. On the contrary, the distribution of water resources tends to follow the dominating power structures with *campesinos* at the bottom of the

hierarchy in the river basin (Stewart 1970:19, Bengoa 1988:182f, Montecino Aguirre 1989:21, C2, C3). The probability that peasant communities will try to get assistance from the widely recognized Chilean WUA's hence seems low.

On the other hand, there is always a legal possibility to create a WUA. This would strengthen the groups' bargaining power by making their judicial status considerably stronger (Comisión Nacional de Riego 2003, Vergara Blaco 1998). Unfortunately, this door too might be closed to many *campesino* communities. The problem of collective action is firstly always present and is only possible to overcome under specific circumstances (Ostrom 1990). Another problem of a more practical nature is the bureaucracy and high formalism within the General Directorate of Water (DGA), the directorate responsible for planning water resources and for granting water rights (Bauer 1998:83f). According to officials at the governmental agency in charge of promoting and defending the interest of small agriculture, *Instituto de Desarrollo Agropecuario* (Agricultural Development Institute, INDAP), only 5 % of the *campesino* water communities they wanted to formalize under the Water Code during a six-year period where regularised (C3). The slow bureaucracy and high formalism in the regularisation of water user associations within the DGA is so well known, that even governmental agencies under the same Ministry avoid getting into the judicial labyrinths in the implementation of irrigation projects and regularisation of water user associations (C8).

Another aspect that contributes to the communities' weak bargaining position is the fact that the group is in general poorly organized. Chilean rural NGO's have seen a sharp decline in their membership after the democratisation in the 1990s. As an example, the number of *campesinos* associated to a cooperative has declined from 75,000 members in 1973, to 10,684 in the year 2000. Membership in labour unions has shown the same decreasing tendency (36,000 members in the year 2000, from Gómez 2001:248ff). Furthermore, the capacity of rural NGOs to assist their members in cases of water conflicts is practically nonexistent. The same applies to environmental NGO's in Chile (C6). Even if rural NGOs acknowledge the Water Code's implications for their members as an important issue (C6, C13, FAO 2001), none can provide the necessary legal and technical help (C1, C3, La Voz del Campo *pers. comm.* 2002).

The Judicial System

Another way to challenge a potential break of the status quo is to take the case to court. The courts play a strategic role in the market model. They must both protect private rights from unwarranted state regulation, and resolve conflicts among private parties, as in the issue

of water conflicts (Correa Sutil 1999, Bauer 1998:19, Menell 1992:5001f). This too, however, seems to be a costly option for members of the *campesino* community.

The main problem with this conflict resolving institution is, as water experts recognize, that the “system is too slow, too costly and too unpredictable” (Briscoe et. al. 1998:9) and that “the institutional capacity of the Chilean judiciary to fulfil its more strategic role is dubious” (Bauer 1998:19). It is unpredictable because judges often must take a decision based on limited information or technical expertise, few legislative or constitutional guidelines, and little time for deliberation (Bauer 1998:22, 80-84). It is slow, because the Chilean judiciary system is obviously under-resourced to the needs of Chilean society (Correa Sutil and Barros Lazaeta 1993:76f, Dakolias 1999:11). An estimate of the average length of an ordinary civil case in 1992/93, as an example, is on the order of 1009 days (Vargas Viancos and Correa Sutil 1995:44). These circumstances give the suit a highly unpredictable character. Studies also show that “white collar crimes” and environmental violations are those kinds of procedures that take most time to settle (Vargas Viancos and Correa Sutil 1995:149).

But what if the group still wants to pay the cost for taking the case to court? As to the total costs of lawyer fees in connection with an appeal to court, they are estimated to \$670 USD, with an additional fee of \$140 USD in case of appeal to a higher court (Balmaceda *pers. comm.* 2002). This might sound like a small sum for protecting such a fundamental resource as water, but we must keep in mind the total annual income of a *campesino* in the majority of cases is well below \$500 USD (see Table 6.2. above). Even if the Chilean government provides possibilities for free legal assistance - such as from the *Corporaciones de Asistencia Judicial* - this assistance tends to be irregular and with chronic lack of personal and financial resources. (Correa Sutil and Barros Lazaeta 1993:82f, Garro 1999, Harasic Yaksic 1988, C9).

One aspect that further complicates the *campesino* communities’ willingness to enter the judicial system is the fact that the Chilean courts are not seen as an institution treating all Chileans alike. On the contrary, a majority of low-income Chileans perceive the Chilean courts as an institution, put bluntly, designed “by the rich, for the rich” (see also Bjornlund and McKay 2002:775). A survey study among a representative sample of low-income households in three Chilean cities illustrates this point (Table 6.3).

This astonishingly low trust in the Chilean judicial system makes low-income households particularly sceptical about taking any kind of violation to court. The results of this widespread scepticism to the courts and its officials results in that most violations like robbery,

trespassing or sexual abuse are not reported by a majority of low-income citizens (Correa Sutil and Jiménez 1997:46).

Table 6.3. Low-income households and trust in the judicial system, Chile

Claim	Agree	Disagree	No opinion
“In Chile, there are two kinds of justice. One for the rich, and one for the poor.”	88,7 %	8,8 %	2,6 %
“Reporting a robbery or assault is a waste of time, because nothing will happen anyway.”	84,2 %	12,4 %	3,4 %
“The Chilean judicial system is slow”	95 %	3,1 %	1,9 %
“Judges treat rich people in one way, and poor people in another”	64 %	10%	No info.

Source: (Vargas Viancos and Correa Sutil 1995:137,155), (Correa Sutil and Jiménez 1997:40).

Though the survey only provides indirect evidence for the low confidence peasant communities have for the judicial system, interviews with officials in Chile confirm that these communities provide no exception (C9, C12, C14, C15, C16). As the director of a regional office under the Program Access to Justice (Programa de Acceso a la Justicia, PAJ) puts it:

Q: Do peasant communities trust the Chilean judicial system?

A: I think that the experience in general has been bad for small farmers, and it is obvious that there is a mistrust and uncertainty. An not only in this case, but also in the judicial system in general.

(Juan Zericueta, PAJ-Buin, interview C11)

The Game Theoretic Equilibrium

The important question at this point is what the presented obstacles to access to *both* existing water user associations (if one exists), and the cost and uncertainties embedded in the judicial system imply for the extensive game presented earlier (See Figure 6.2 above).

First of all, assume that A is an actor which is considered “strong”, i.e. that has both extensive financial and/or social resources such as a

large industrial farmer, a hydroelectric company, or an urban water company. In addition, assume that player B is a peasant community.

If the following relationships between the players' preferences exist, and each player's preference order and the full history of the game is common knowledge, the outcome will be to the benefit of the first mover A. More precisely; if the preference order for both players is the following;

Water user A: DC \succ CC \succ DD \succ CD
 Water user B: CD \succ CC \succ DC \succ DD

where " \succ " means "is preferred to"), then when a more "powerful" user than B starts to extract water that negatively affects this group, group B has no other rational option than to accept the violation.

More precisely, both water users prefer a division of water to their benefit, compared to the status quo (DC \succ CC for player A, and CD \succ CC for player B). But the important difference between the two users is that peasant farmers will avoid a conflict thereby preferring to accept the violation, i.e. an outcome advantageous to A. According to what has been discussed above, it seems reasonable to assume that members of the *campesino* community will prefer to accept a violation to initiate a costly, highly unpredictable, and probably non-beneficial judicial process. Let us look at the strategies available in the game presented earlier, but this time in normal form.

Figure 6.4. Dynamic water market game in normal form.

		<i>Player B</i>			
		Always C	Always D	Same as A	Opposite of A
<i>Player A</i>	C	2,2	4,1	2,2	4,1
	D	1,3 *	3,4	3,4	1,3 *

Comment: A and B represents players. A is an urban water company, and B a group of peasant farmers. A makes the first choice, and B has four possible strategies. Figures 1 to 4 represent most to least preferred outcomes. By convention the first pay-off refers to the column player (Player A), and the second pay-off refers to the column player (B). * indicates Nash-equilibrium.

As described in Figure 6.3, A makes the first choice, and B has four possible strategies: i) always cooperate or ii) always defect independently of what A makes, or iii) do the same or iv) the opposite of Player A. The Nash-equilibrium in this game is DC. Thus, the

characteristics of the game defined by the market's institutional framework, and the fact that water users are highly heterogeneous in terms of social and economic power, make it very costly and irrational for poor water users to report violations of their water rights. Though this might seem obvious to some, this is a fact yet not considered or elaborated thoroughly by experts and governmental agencies (Galaz 2004).

Could not these inherent deficiencies in the judicial system and the Chilean water user associations, be used by peasant farmers to steal water from wealthier water users? Stealing of water between peasant farmers, and by industrial agriculture during critical drought periods is a fact widely recognised among experts (C1, C2, C8). There are, however, several characteristics of the game and of richer users - such as industrial agriculture and urban water companies - which makes this robbery less likely.

First of all, these water users have considerably more economic resources than other users. This implies that they have the possibility to challenge this break from the status quo by taking the case to court, and paying the additional lawyer fees and technical studies. The costs involved with losing such a case, and the limited economic resources of *campesino* communities, are sufficient to deter them, or any other group with limited financial assets, from such an attempt. Less wealthy natural resource users are thus in game theoretic terms more risk averse, and thus have a much weaker bargaining position (Elster 1989:80ff, Knight 1992:126ff).

Second, both industrial agriculture and urban water companies are considerably better organised than rural NGOs. As for industrial agriculture, their organization *Sociedad Nacional de Agricultura* is considered the most powerful NGO in Chile today (Gómez 2001, Gómez and Echeñique 1988:213-217). Third, big agriculture tends to dominate one key institution in the resolution of water conflicts: the water user associations (C1,C2,C8, Bauer 1998:67). These characteristics make the stealing of water by the poor from wealthier users highly unlikely, and in game theoretic terms, non-credible (Kilgour and Zagare 1991:307f).

IV. EMPIRICAL VALUATION OF THE GAME THEORETICAL PREDICTIONS

The discussion above intended to highlight some of the problems underprivileged peasant communities seem to face in Chilean water politics and water management institutions. In addition, I have tried to highlight some implications following from these assumptions. Although the discussion above does integrate some empirical data, we are still far from concluding the analysis. In this part, I elaborate the livelihood

vulnerability peasant communities' face in the Chilean water market due to their seemingly weak bargaining position. I do this in three steps. In the first, I present a case study to elaborate the mechanism prediction following from the bargaining model presented earlier in the chapter. This case is chosen for two main reasons. First of all, the actors involved differ substantially in terms of both social and economical bargaining resources. Second, the case is only one of the most well-documented water conflicts in the country hence allowing a more detailed analysis.

In the second part of this chapter, I present some provisional evidence of whether the bargaining model is applicable on other cases. In the third part, I present the result from interviews with peasant community and water experts in Chile to further assess the validity of the game theoretical prediction. The last part summarizes the chapter.

Elaborating the Mechanism - Water Conflict Resolution in Las Pataguas de Valdivia de Paine

Peasant farmers in Las Pataguas de Valdivia de Paine, located 50 km from Santiago and south of the river Maipo, have experienced a severe and long-lived water conflict with an upstream water user. The conflict started in the end of the 1970's when Alfredo Troncoso, a wealthy real estate investor bought six upstream plots in the area. Downstream peasant farmers soon experienced water shortage due to constructions assumed by the investor on his upstream plots. The deviation of water was, according to governmental officials and the final court order in 2003, a deliberate attempt to destroy the productivity of the land, and force the peasant farmers to sell their plots to a lower price (Cancino 2001, Document 1). This problem has affected the income of 300 persons dependent on small scale agriculture in an area of about 200 hectares to such an extreme, that a number of them have felt obliged to sell their plots and find other sources of income (Cancino 2001, C3, Document 1). The peasant farmers in this case were nonetheless organized in a local labour union (*Sindicato de Parceleros de Las Pataguas*) formed in the 1970's as a result of the agricultural reform CORA (*Corporación de Reforma Agraria*). Consequently, a government supported technical study was conducted in 1984 to assess the legal status of the farmers' water rights. Despite both these facts, the peasant farmers faced serious problems in defending their water rights in the judicial system.

It was not until after more than ten years that a few of the farmers individually decided to take the problem to court. Why this process was initiated after over a decade might seem difficult to understand, but Bernardo Rojas' (i.e. the president of the local peasant labour union in

the area) answer presented in the journal *Chileriego* provides an initial answer:

He [Mr. Troncoso] did not shut off the water for all of us at once, says Rojas, first he shut off the water of some and then the others. Me and two other farmers were the first that got our water cut off, and at that time we did not know where to claim, or if our claim could make the judge to 'keep us in' [put us in prison].

Source: Interview with Bernardo Rojas from *Chileriego* (2001).
Clarification in brackets mine.

The president's statement illustrates both the lack of capacity and trust in the judicial system among underprivileged communities as discussed earlier in the chapter. As Cristian Correa, former director of the Ministry of Justice's "Access to Justice Program" bluntly puts it: "They [peasant communities] are sceptical to the judicial system, and the underprivileged experience is that there is no justice. And that money is required, and that the powerful always win. This is an opinion based on experience, on the daily experiences [of the communities] (C9)."

A number of farmers did nonetheless try to put an end to the problem in their own way. Some of them chose to - at their own expense - to buy an electric pump or build a well (see Document 1, pp.4f, 7), others chose to take the problem to court individually. One of the rulings was in favour of the farmers. This however, only stopped the deviation of water for a couple of years (Cancino 2001, *Chileriego* 2001). The same procedure was repeated in 1991 when one of the farmers Humberto Badilla Dinas initiated a court appeal (Causa Rol N^o 22.237, 20th August 1991) which led to a ruling in favour of the farmers, but this again did not stop the continued violations of their water rights by the investor. The repeated violations were however finally settled in court in 2004. The reason for this is that this particular conflict was targeted as a pilot project by cooperating Chilean authorities and NGO's. These cooperating parties were the government organizations Agricultural Development Institute (INDAP) and the *Programa de Acceso a la Justicia* (PAJ), and the peasant NGO *Confederación Campesina Nahuén*. The project that was initiated in 1999 and resulted in both legal and hydrological studies (e.g. Document 3) to settle the effects on downstream users imposed by the real estate investor (Cancino 2001). The case finally settled in a complex judicial process including various court appeals (e.g. Document 1, Document 2).

Back to the Battle of the Commons

One important reason to why this conflict did not settle is the fact that the users hadn't jointly created a *Comunidad de Agua* (water community), that is CPR-institutions to prevent and solve water conflicts (Cancino 2001:3, C12). Though this certainly is puzzling if we consider the potential and long-term collective benefits of creating such institutions (c.f. Ostrom 1990, Ostrom 1998), the reason is fully understandable from the bargaining perspective presented in the second chapter.

As interviews with involved government officials in the area reveal, there were good reasons for peasant farmers to accept the situation for at least three reasons.

First, the defector in this case was considered by the farmers to be a very wealthy and well-connected individual in the area (C3, C12, C13). More precisely, the actor was considered to have both the economical and social resources (in terms of influential friends and professionals in the area) necessary to challenge any defection or initiated conflict from the peasant farmers' side who clearly lacked the resources to do the same (e.g. C14).

Second, earlier and historical interactions between peasant communities and powerful actors in the country - as the defined by the colonial agricultural system legacy, the "latifundio" - also worked against peasant farmers' attempt to create effective CPR-institutions. The issue here is that peasant communities tend to fear and avoid initiating conflicts with what they consider powerful and "patrón"-like actors. Though this certainly might sound like a far too cultural explanation to fit a rationalist analysis, this is nonetheless a point made repeatedly by peasant community experts (C3, C9, C11, C12, C16). As F. Bastidas, consultant and engineer at the National Commission for Irrigation (*Comisión Nacional de Riego*, CNR) puts it:

Q: What does this "cultural power" mean?

A: We have serious problems with small farmers that have its root in a cultural problem. [...]. They are in general over 45 years; they experienced the processes in the "latifundo" and the division of land. People who have lived with the "latifundo" view the world in a different way compared to you who are educated. They accept a person that is powerful, and that exercises their power over them and others (C12).

As C. Correa, former director of the government program Access to Justice puts it:

Q: Which are the most important problems for underprivileged peasant communities today concerning the defence of their water rights?

A: There are a number of important aspects. [...]. There is also a problem of social relations in the countryside because they build on hierarchy that makes dialogue difficult, and has its roots in the “latifundo” that existed until 30-40 years ago (C9).

Third, and as discussed in detail earlier, peasant farmers’ trust to the judicial system is clearly and rightfully low, thus providing no realistic option.

Fourth and last, as the result of the factors above, the investor is indeed put in a very privileged status quo position where he - before the unique involvement of cooperating Chilean government programs - could extract and divert water to downstream users without risking any serious retribution. As this is likely to be common information to the actors, peasant farmers are facing a tough bargain in the Battle of the Commons Game (see chapter 1 for details). Assume that Player 1 in the figure below is the investor in our case, and that Player 2 denotes the downstream peasant farmers discussed in the case study.

Figure 6.5. Battle of the Commons Game in Chile

		Player 2	
		A'	A
Player 1	A	Δ_2 Δ_1	$x + \epsilon_2$ x
	A'	x $x + \epsilon_1$	Δ_2 Δ_1

Comment. The game theoretic model illustrates a Battle-of-the-Sexes Game reformulated as a Battle-of-the-Commons Game. The actors have two options, ‘A’ or ‘A’’. Symbols represent the pay-offs. ‘**’ represents a Nash-equilibrium.

The players have a common interest in coordinating their choices so that one of the outcomes (A',A' or A,A) is reached, but Player 1 would prefer the first option (A',A') and Player 2 the second (A,A). ϵ_1 and ϵ_2 represents the distributional advantage accruing to one of the actors if a particular alternative (A or A') is chosen. The preference relation is thus assumed to be:

Player 1: $x + \epsilon_1 > x > \Delta_1$
 Player 2: $x + \epsilon_2 > x > \Delta_2$

Δ_1 and Δ_2 represents the payoffs that the actors will receive if they fail to achieve an agreement, i.e. the breakdown values.

What is interesting in this particular case is that the more powerful player could credibly commit to his most preferred alternative (A'), more precisely the absence of a well-functioning conflict resolving CPR-institution, but still maintain the cooperative behaviour of downstream water users. Although the conflict has entered various legal processes, consider that 1) judicial processes were not initiated until ten years after the first defections, 2) many downstream water users chose to migrate or, 3) to work out the conflict by financing and building their own wells. The empirical material presented hence points out that the equilibrium outcome is to the benefit of the stronger player.

Elaborating the Equilibrium Outcome

How common the outcome above is, is nonetheless difficult to assess. The reason for this is that the prediction earlier in the chapter was that infringing upon the water rights of poor water users, such as peasant farmers, will not be reported to any of the organizations responsible for the solution of these conflicts. Information of these cases will therefore be hard to find without extensive field studies. As a result, evidence of water violations against underprivileged users is anecdotal and dispersed among various actors, such as agricultural experts and erratic appearances in media. Consider another, but similar case as the one presented above.

Small farmers organised in a water user community in the Azapa valley, Arica, have experienced similar problems. In 1981 the water company SENDOS (Servicio Nacional de Obras Sanitarias) made a request to the DGA (General Directorate of Water) - the governmental agency in charge of granting new water rights - for the exploitation of 550 litres/second of water. The request was denied by the DGA, largely because of a petition put forward by the farmers showing that this extraction would severely affect existing water flows normally used by them for irrigation. Despite DGA's decision, and without the necessary water rights, SENDOS decided in 1984 to start the constructions necessary for water exploitation. Once again, the farmers chose to take the case to court, which ruled in favour of the farmers and ordered a halt of the constructions. This temporarily halted the construction, but in 1991, the water company ESSAT (Empresa de Servicios Sanitarios de Tarapacá S.A.) - a privatised version of SENDOS - reassumed the exploitation of the aquifer in the Azapa valley. This

violation was once again taken to court, but this time, the court rejected the claim and the farmers lost the case. ESSAT is now exploiting water resources in the valley (Aviles Herbas 1993).

This example is a more detailed description of one of the cases presented in the next table. The table is a collection of what normally is seen as “anecdotal evidence”, and presents a number of cases of water rights violations against underprivileged water users. The cases were extracted by searches in on-line media archives, through interviews with agricultural experts and material accessible through the National Library in Santiago de Chile.

Table 6.4. Water Right Violations - a selection of cases

Affected	Accused	Comment	Source
Indigenous Mapuche communities	Aquaculture companies (salmon)	Over extraction from lakes Lleu Lleu, Panguipulli, Neltume, Pullinque, Calafquén, Maihue affects mapuche communities' historical water rights. (Region X)	(Toledo Llancaqueo 1996)
Indigenous Mapuche communities	Mining companies	Polluted water due to mining in Santa Celia, Repocura and Guamaqui (Region IX)	(Toledo Llancaqueo 1996)
Indigenous Aymara and Atacameño communities	Mining companies and urban water companies	Water historically used by indigenous communities regularised and used by companies (Region I, II)	(Toledo Llancaqueo 1996)
Indigenous Mapuche communities	Mining companies, industrial agriculture, forest companies	Water used by indigenous communities regularised and used by others in Quillem, Cautín, Traiguén, Allipén, Toltén (Region IX)	(Toledo Llancaqueo 1996)
Peasant farmers	Industrial farmer	Stealing of groundwater rights in Sector El Lucero de Lampa (Metropolitan Region)	(INDAP 1997)
Peasant farmers	Industrial farmer	Construction deviates water on purpose historically used for irrigation, Sector El Carmen, Marchique (Region VI)	(INDAP 1997)

Peasant farmers	Industrial agriculture	Construction of water pumps for irrigation by industrial fruit farming affects the water flows of small agriculture in La Paloma/Cogotí. (Region IV)	(C1)
Small agriculture	Servicio Nacional de Obras Sanitarias (SENDOS), ESSAT and others	Repeated illegal construction of infrastructure and exploitation of groundwater affects agriculture activity in the area Valle de Zapata. (Region I)	(Aviles Herbas 1993)
Small agriculture	Mining company Sociedad Química y Minera de Chile (Soquimich)	Company claimed and received water rights from governmental agency DGA. Water resources were traditionally used by farmer community in the Loa River, Quillagua Valley (Region II)	(Melin 2001)
Indigenous communities	Company Nazca	Company claimed and received water rights from DGA traditionally used by indigenous community Ayquina in Vegas de Turi. The community took the case to court with help from governmental agency CONADI (Corporación Nacional de Desarrollo Indígena) (Region I,II)	(Huerta 2000)
Peasant farmers	Industrial agriculture	Unlawful acquirement of groundwater rights in La Ligua and Petorca Valleys (Region IV)	(Budds 2004)

Comment: The table shows a number of claimed water rights violations including underprivileged water users and larger water users. The list has been compiled using by searches in on-line media archives, through interviews with agricultural experts and material accessible through the National Library in Santiago de Chile. Table created during two field visits in 2002 and 2004.

The intention of the table is to display that the mechanism identified earlier - using game theoretical reasoning combined with empirical data - seems to be an actual phenomenon in Chilean water politics. Though the number of cases described might seem few, interviews with peasant agriculture experts indicate that the number of cases could easily be extended.¹¹ Even if the stealing of water resources, in

¹¹ The interviewees all have extensive field experience in the field of water development projects in peasant agriculture, and represent both research

particularly during dry periods, is well recognized problem in Chilean agriculture, these conflicts do nevertheless seem to have a bias in the sense that weaker parties such as peasant communities are worse off, that is seldom get resolved easily and to their benefit (C1, C2, C9, C11, C12, C14, C16). As one of the interviewees bluntly puts it:

Q: So, would you say that violating the water rights of peasant communities in Chile today is easy?

A: Sure, much more than easy. More than easy.

Interview with F. Bastidas, C12.

Hence there seems to be good reasons to reevaluate the distributional impacts of the Chilean water regime.

V. CONCLUSIONS

The cases discussed above demonstrate the complex interaction between power asymmetries among water users (based not only on financial resources, but also on a history of asymmetrical interdependence), deficiencies in external institutions concerning conflict resolution (i.e. the judicial system), and the low trust among underprivileged communities in the mentioned institutions. Although the conflict in the case study is to be finally settled after almost 30 years, it is important to note that the case did not proceed until government authorities in a pilot project stepped in and organized and funded both hydrological and legal studies to strengthen the actors' case in court. There is no reason to believe that other communities receive similar support from authorities, on the contrary. And as additional material shows, this setting might be creating incentives that apply more generally in the country.

What About External Institutions?

Similar effects of the rich taking water away from the poor could probably be found around the world under many public and community allocations systems. Critics would thus argue that the introduction of a market under ideal circumstances even might reduce the likelihood that powerful interests will take more than their share of water,

institutes and government agencies. Though both NGO:s and a wide variety of experts have been interviewed to provide background information for the study, only the opinion of experts with field experience of peasant agriculture have been used in this section. The total numbers of interviews that qualify are seven. For details of the interview, see Appendix.

because there is at least the option to buy out poorer water right holders.

This objection is undeniably relevant, but it does disregard that central aspects of the games described in the chapter are market specific. First of all, the institutions in which the market in the end must be embedded, exclusively determine the structure and outcome of the games. The fact that the market model heavily relies on the judicial system, and decentralised conflict resolution in water user associations, is a key determinant for the outcome of the game. Once it is recognised that the legal system frequently is a highly imperfect and expensive institution for resolving environmental disputes, the case for free-market environmentalists and water markets is weakened.

Second, the fact that natural resource users consistently - and especially in developing countries - are highly heterogeneous in economic and social power, and thus have highly unequal access to key conflict resolution arenas, makes this problem even more serious. In game theoretic terms, users with a credible threat and high breakdown values, that is wealthy users, are provided with a highly advantaged position. This too is a specific result of the market model with its unique and heavy reliance on decentralised conflict resolution.

Thirdly, the creation of a market does not only provide water users with information on increasing demand and prices (c.f. Arrau Corominas 1998, Alicera et. al. 1999:16) but also radically reduces uncertainty on how much there is to be made on a defection. That is, not only does a market provide rational actors with the information needed to efficiently allocate water resources through the market, but also with information on exactly how much there is to be made in violating underprivileged users' water rights, which makes a defection more probable (c.f. Baland and Plattau 1996:45).

This ends our Chilean case study. The next chapter summarizes and elaborates the findings.

Appendix 1. Interviews and Personal Communication

<i>Code</i>	<i>Name</i>	<i>Comment</i>	<i>Phase</i>
C1	Miguel Bahamondes	Grupo de Investigaciones Agrarias (GIA), Santiago de Chile 2002-05-06. Researcher and consultant in issues of peasant agriculture.	I
C2	Carl J. Bauer	Resources For the Future/Universidad de Chile, Santiago de Chile 2002-04-10. Water policy researcher.	I
C3	Carmen Cancino	Instituto de Desarrollo Agropecuario (INDAP), Santiago de Chile 2002-04-25. Peasant agriculture expert and community developer.	I
C4	Rene Hadjigeorgalis	Researcher, Universidad Católica, Santiago de Chile, 2002-05-17.	I
C5	Andrei Jouravlev	United Nations Economic Commission for Latin American and the Caribbean (ECLAC/CEPAL), Santiago de Chile, 2002-04-14. Water policy expert.	I
C6	Bernardo Reyes	Instituto de Ecología Política/Foro del Agua, Santiago de Chile 2002-03-23. Environmental NGO representative.	I
C7	Aldo Ojeda	Dirección General de Aguas (DGA), Santiago de Chile, 2002-04-22. Lawyer and expert on legal matters concerning the Chilean Water Code.	I
C8	Aurora Puig	Dirección de Obras Hidráulicas (DOH), Santiago de Chile, 2002-05-02. Director at DOH.	I
C9	Cristián Correa	Former director of Programa de Acceso a la Justicia (Access to Justice Program, PAJ), Santiago de Chile, April 2004.	II
C10	Alejandro Vergara Blanco	Prof. at Pontificia Universidad Católica De Chile, Santiago de Chile, April 2004.	I
C11	Juan Francisco Zericueta	Lawyer and Community Coordinator, Programa de Acceso a la Justicia (PAJ), Buin, April 2004.	II
C12	Francisco Bastidas	Master of Engineering, Comisión Nacional de Riego (CNR), Santiago de Chile, April 2004.	II

C13	Alicia Muñoz	ANAMURI/MUCECH (peasant NGO), Santiago de Chile, April 2004.	II
C14	Julio Abufom	April 2004 INDAP, Metro	II
C15	Sergio Gómez	Researcher, Instituto de Ciencias Sociales, UACH, Santiago de Chile, April 2004.	I
C16	Jorge Vergara	Agricultural Engineer, and coordinator of the program “The Development of Irrigation in Underprivileged Communities”, Comisión Nacional de Riego (CNR), Santiago de Chile, 2004-05-03.	II

Personal Communication in Chile

Balmaceda (2002). Personal communication (e-mail) with lawyer J. Francisco Balmaceda H. at Balmaceda, Hoyos and Cía. Abogados, Santiago de Chile. May 2002.

La Voz del Campo (2002). Short phone interview with union secretary, 2002-04-13.

Appendix 2. Methodology

The interviews presented in this chapter have been conducted in a two step process in February - May 2002 (denoted Phase I), and March-April 2004 (denoted Phase II). Phase I was realized with the intention of getting a general picture of the institutional context of Chilean water policy, social representation in existing water user associations, and a general picture of the social impacts of the Chilean water market regime. The results from these interviews have been published in Galaz (2004). Interviews in Phase II were conducted with the ambition of getting more solid empirical data for the case study in Las Pataguas Valdivia de Paine described earlier in the chapter, and to elaborate the generality of the game theoretical prediction discussed in Galaz (2004), and presented in the chapter.

The selection process has been assumed to as far as possible get the picture of a wide span of actors, i.e. academia, government officials, NGO:s and water policy and peasant agriculture experts in the country. Unfortunately, two representatives did not reply to repeated requests to participate in the interviews. The first were the president of the Confederation of Chilean Canalists (Confederación de Canalistas de Chile, CCC), and water policy experts at the National Association for Agriculture (Sociedad Nacional de Agricultura). Both these organizations are viewed as representing industrial agriculture interests. For source critical reasons, the interviews of supposedly biased actors such as environmental and peasant NGO:s have not been used to confirm the hypothesis presented in the chapter.

Chapter 7

Comparing the Cases – Conclusions

Human societies dependent on natural resources are facing a number of fundamental challenges. Global environmental change is likely to entail increasing environmental variability and in addition radically modify the capacity of natural systems on which many communities depend. What's more, population growth, increased food production, urbanization and industrialization add additional stress to already vulnerable ecosystems (Millennium Ecosystem Assessment 2005). As discussed throughout the preceding chapters, how societies design and maintain their institutions is a central and critical issue in coping with these challenges.

The problems posed increase once we recognize that both the number and types of actors involved in creating and maintaining these institutions is likely to increase. The reasons are both current shifts in political systems that aim at increasing the participation of - and even shared management with - various actors such as local communities, non-governmental organizations, industrial interests, international organizations and academia. The question of how heterogeneity affects institutional emergence and change is therefore likely to become a crucial challenge for political science in general and neo-institutional theory in particular.

Throughout this study I have elaborated how differences in social and economical power affect the creation and maintenance of institutions designed to manage commonly used natural resources, i.e. CPR-institutions. I have used some simple game theoretic models to tease out under what circumstances these differences affect the distributional impacts of institutional choice in water management institutions. I have also elaborated how the interaction between heterogeneous natural resource users is structured and fundamentally affected by what I call "external institutions".

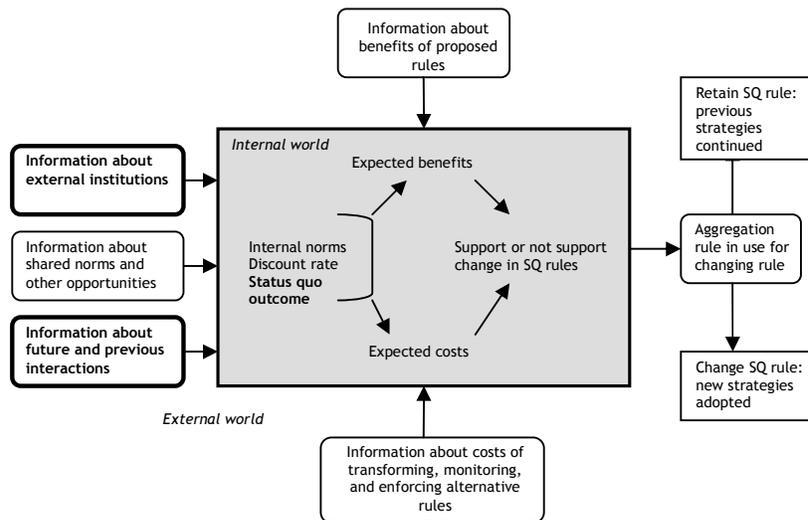
This last chapter summarizes the findings from the preceding chapters, and is organized in the following manner. In the first part, I summarize and analyze the outcome of the Battle of the Commons Game in Sweden and Chile. In the second part, I discuss the implications of the analysis for present theoretical development concerning the impacts of heterogeneity for the distributional impacts

of collective action. In the third part, I discuss the limits of the study with a special emphasis on the limits of the rational choice analysis. The fourth and last part discusses some future research challenges.

I. THE BATTLE OF THE COMMONS IN SWEDEN AND CHILE

Preceding chapters have shown the rather complex interaction between external institutions, heterogeneity and institutional choice. As discussed in the first theoretical chapters, external institutions are likely to affect the outcome of the distributional battle natural resource users' face in creating and changing jointly created CPR-institutions.

Figure 7.1. A Reformulated Framework



Though the socio-political and ecological context, and the problems water users face in the two countries differ considerably, the use of the game theoretic model (chapter 1) in combination with the analytical framework (presented in chapter 2) enhances the possibility to show why and how a given set of factors bring about the effect in question (c.f. Scharpf 1997:29f, Ostrom et. al. 1994:23-27). Allow me to summarize and discuss the results from the empirical studies using the modified framework presented in chapter 2.

The Role of External Institutions

The Swedish case study showed the key role that external institutions play in defining the outcome of the Battle of the Commons game. More precisely, not only did these institutions define the players, determine the minimum level of scope, and subdue actors to pay for the activities assumed by the CPR-institutions - but brought about industry's credibility to its most preferred institutional solution, i.e. water management institutions that have the lowest scope possible. More precisely, the only current obligations to operators such as industry and municipalities as defined by the Environmental Code, is to participate in joint environmental monitoring activities. This is the reason why the commitment to withdraw from cooperation, if the scope is expanded, can be seen as credible. The fact that the river faced - and still faces - rather serious environmental problems was seemingly not enough to trigger institutional change.

External institutions also played a crucial role in the Chilean study. The fact that the market model heavily relies on the judicial system - which in Chile is a highly imperfect and expensive institution for resolving environmental disputes - and that decentralised conflict resolution in water user associations tend to be viewed as skewed to the advantage of powerful interests - seems to affect the outcome of the games presented in the chapter. This results in a situation where the norms of cooperation disadvantage underprivileged actors such as peasant communities.

The Role of Information about Future and Previous Interactions

Although external institutions certainly matter, the outcome is seriously affected by the intentional actions of actors. In this context, the subjectively defined interests of actors and how they perceive other actors is more than crucial. As discussed earlier, part of the solution to the multiple equilibria problem - at least if we want to use game theoretical models empirically - lies in the subjective expectations of actors. Past history may thus act as a mechanism that enables them to coordinate in selecting between the multiplicities of potential equilibria to which we know repeated interactions give rise. This becomes even clearer from a bargaining perspective, where previous interactions in both cases provided a fundamental piece of information to actors trying to estimate the credible commitment of others (see chapter 2).

In the Swedish case, the fact that industrial interests can credibly commit to their most preferred institutional solution seems to be common knowledge among the actors. More precisely, industrial

representatives have clearly signaled that they will not accept an agreement above the minimum as required by the Environmental Code. Repeated interaction such as frequent meetings among the actors gives the actors various possibilities to signal this preference. As the interviews show, actors wanting to change the scope of water management CPR-institutions are well-informed about this fact and the legal realities, which results in a situation where every attempt to change the scope of the CPR-institutions is seen as fruitless.

The Chilean case displays the same phenomena. Peasant farmers struggling to deal with water conflicts are not only facing tough obstacles such as a low confidence to the judicial system and existing water user associations, but also the heavy burden of history. More precisely, earlier and historical interactions between peasant communities and powerful actors in the country - as defined by the legacy of a colonial agricultural system, the "latifundio" - also worked against peasant farmers' attempt to create effective CPR-institutions. The issue here is that peasant communities tend to fear and avoid initiating conflicts with what they consider powerful and "patrón"-like actors.

Recapitulating the Battle of the Commons Game

Real-world constellations will often allow for several "cooperative" solutions that may differ significantly in their distributive consequences. This is a fact that is seldom recognized in mainstream studies of CPR-institutions. The Battle of the Commons game presented in the opening chapters does nonetheless capture both the dynamics of coordination and conflict.

The logic is the following: if Player 1 can credibly commit to play A' in a repeated game, the rational action for Player 2 will be to follow the rule and agree to A'. Although Player 2 may prefer the other alternative, the knowledge that Player 1 will play A' despite of what Player 2 does constrains his/her choice of playing A. More generally, if the alternative that Player 1 prefers - that is A' - is to be self-enforcing, s/he must find a way to commit to the A' strategy in repeated plays of the game. If Player 1 can make this commitment credible, the rational action for Player 2 will be to follow the rule and play A'. The case studies presented in the preceding empirical chapters highlight the existence of this mechanism in both contexts.

In Chile, there are a number of facts that seriously affect peasant communities' weak bargaining position as defined by their breakdown value. The main reasons are that they lack both the social and financial resources to successfully defend their rights in the judicial system, and in existing water user associations. In addition, both these conflict resolving institutions seemingly lack the capacity to quickly solve the

sort of conflicts that emerge among highly heterogeneous water users. What's more, these communities are likely to avoid initiating conflicts with what they consider powerful - i.e. wealthy, well-connected and on a higher social position - actors.

Figure 7.2. The Battle of the Commons Game

		Player 2	
		A'	A
Player 1	A	Δ_1 Δ_2	x $x + \epsilon_2$ * *
	A'	$x + \epsilon_1$ *	Δ_1 Δ_2

Comment. The game theoretic model illustrates a Battle-of-the-Sexes Game reformulated as a Battle-of-the-Commons Game. The actors have two options, 'A' or 'A''. Symbols represent the pay-offs. '**' represents a Nash-equilibrium.

This setting provides the latter kind of actors a highly beneficial situation that they can - and in fact have exploited. Consider again the game matrix in Figure 7.2. Assume that Player 1 represents a *campesino* community, and Player 2 a more powerful actor such as a transnational agro-industry or a wealthier industrial farmer. The players have a common interest in coordinating their choices so that one of the outcomes (A',A' or A,A) is reached, but Player 1 would prefer the first option (A',A') - here meaning CPR-institutions that are able to quickly solve emerging water conflicts - and Player 2 the second (A,A) - here meaning CPR-institutions that at times accepts defection from Player 2 but sanction potential defections from Player 1. ϵ_1 and ϵ_2 represents the distributional advantage accruing to one of the actors if a particular alternative (A or A') is chosen. The preference relation is thus assumed to be:

Player 1: $x + \epsilon_1 \succ x \succ \Delta_1$
 Player 2: $x + \epsilon_2 \succ x \succ \Delta_2$

Δ_1 and Δ_2 represent the payoffs that the actors will receive if they fail to achieve an agreement. As discussed in the Chilean study, peasant

farmers fearing that the status quo situation might be worse than the institutional solution preferred by a more powerful actor, might actually settle for norms of cooperation that is skewed to their disadvantage. As the empirical analysis indicates, powerful actors are indeed able to strategically commit to their most preferred alternative A'. Again, external institutions such as the weaknesses of the judicial system are crucial for the outcome.

The mechanism in Sweden is similar. Assume that player 1 represents a coalition of high-ambition actors wanting to expand the scope of existing CPR-institutions to tackle several water related environmental problems in a commonly used river (outcome A'A'). Let player 2 represent a coalition of low-ambition actors wanting to keep the level of ambition down as low as possible (outcome AA). Though there are two possible points of agreement, only the latter player is able to strategically commit to its most preferred alternative (AA). The reason for this is - as the case study elaborated - that Player 2 clearly prefers a non-agreement (SQ), to a scope of the CPR-institutions beyond the minimum as required by the Environmental Code.

II. BACK TO THE U-SHAPES

The number of case studies and laboratory experiments focusing on issues very similar to those analyzed in the preceding chapters is remarkable. Yet the results remain inconclusive. As I argued in the second chapter, the motivation of this study rests on three problems with previous research, all having to do with difficulties in assessing the causality between social and economical heterogeneity and collective action.

First, the fact that humans are bounded rational actors and make decisions under uncertainty makes it hard, if not practically impossible, to derive results of the mechanism just by studying the final design of institutions. Social actors often rely on their often imperfect beliefs about the benefits that will be produced by the various institutional forms. The fact that we observe an existing or non-existing relationship between economic inequality (independent variable) and the discriminatory design of CPR-institutions (dependent variable) is not enough to straighten out causality. The reason for this is that the outcome could be the result of unintended consequences of institutional emergence and design (see chapter 1). The argument applies regardless of research design, i.e. large N-studies (e.g. Bardhan and Dayton-Johnson 2002, Molinas 1998, Dayton-Johnson 2000, Varughese and Ostrom 2001) or case studies (e.g. Ostrom 1990, Burger et. al. 2001).

Second, the solution of the repeated prisoners' dilemma game is as discussed exceedingly based on the actors' mutual *expectations* and

credibility. These aspects are hardly captured in large n-studies that base their logic on a simple definition of the independent variable - such as economic heterogeneity measured as differences in landholding among farmers (Molinas 1998), or differences in possession of land, livestock etc. (Varughese and Ostrom 2001:754f). The players and their bargaining resources might hence be identical, but the “action situations” (c.f. Ostrom 1999:498, Ostrom 2005) or “actor constellation” (Scharpf 1997:44f) differ substantially.

Third, the common statement that the relationship between economic inequality and collective action is U-shaped is an interesting starting point and highlights the danger of defining a too simplistic relationship. On the other hand, this account is far from being precise enough to apply empirically.

As the case studies in the previous chapters have elaborated, the distributive struggle in the creation of new common pool resource institutions is structured by not only differences in bargaining resources, but also by what I have called “external institutions”. As discussed earlier, none of the studies referred to earlier takes this well-known fact under serious enough consideration in the design of their studies, despite their potential explanatory power. Allow me to elaborate this last point.

Specifying the Implications

Dayton-Johnson’s (2000) study is a clear example of the implications following from the analysis in the preceding chapters. The ambition of this article is to study “how the self-governed Mexican irrigation societies [...] choose *distributive rules*: rules that govern the distribution of costs and benefits of cooperation among the members of the water using community” (Dayton-Johnson 2000:20). The study combines formal modeling with econometric analysis of field data. Though the study intends to analyze “the possibility that unequal bargaining power among farmers may lead to the adoption of sub-optimal [...] proportional allocation rule, rather than the equal division rule” (Dayton-Johnson 2000:21), the concept “bargaining power” is clearly underspecified. More precisely, although it might seem reasonable for large N-studies to operationalize “bargaining power” as land-holding inequality, the concept has one important drawback. Such a definition does not acknowledge other important sources of “bargaining power” such as the social history of the area, nor the way that strategic interaction is structured by external factors beyond the direct control of actors. This is also an aspect that is poorly elaborated in Knight (1992), Knight (1995) and in applications of that theory such as in Weimer (1997).

Put differently, even though the results support the argument that “higher economic inequality is strongly associated with the presence of proportional/proportional-allocation rule” (Dayton-Johnson 2000:35), we are left wondering why land-holding inequality has such an impact. Is it because the social norms in the Mexican country-side endorse such a rule? Or is the reason that large landholders threaten to leave cooperation if rules are designed otherwise? Or maybe the reason is that large land-holding simply overlaps with other explanatory factors such as social status, key political contacts, or a head-end position in the river? Every single one of these questions brings to light *different* mechanisms that are underspecified in the study (see also Ostrom 1995, Bardhan and Dayton-Johnson 2002).

I see two implications following from this argument. The first one is theoretical in the sense that future studies, both quantitative and case studies - should put more emphasis on analyzing what determines the distributional impacts of CPR-institutions. As discussed here, the possibilities of actors to credibly commit to their most preferred institutional solution as defined not only by their concrete economic and social resources but also by how the game is structured by external institutions and by previous interactions, is a viable alternative. Without a proper understanding of which of the mechanisms described in the section above best explains the intricate link between heterogeneity and commons management, we are likely to provide deficient explanations. It is important to note that none of the mainstream frameworks used to analyze how actors overcome the “tragedy of the commons” are able to provide any guidance for those interested in the aspects elaborated in the preceding chapters (e.g. Ostrom 1990, Ostrom et.al. 1994, Ostrom 1998a, Ostrom 2005).

The second one is more practical. As discussed earlier, large-scale processes such as global environmental change and globalization increasingly challenge existing institutions at all scales (e.g. Homer-Dixon 2002, Sandler 2005), the need for guiding based on the science of politics (i.e. neo-institutional theory) is likely to increase. Theories that fail to deal with the impacts of economic and social heterogeneity on institutional emergence and change are likely to provide poor scientific ground for action.

III. THE LIMITS AND BENEFITS OF RATIONAL CHOICE ANALYSIS

This study has used what by some still might be considered a controversial method of analysis, commonly referred to as rational choice, especially in the field of comparative politics (Golden 1997, Scharpf 1998). In addition, I have tried to develop an empirically fruitful rational choice analysis of what is likely to be one of the most

contested concepts in political science, namely “power”. Throughout this study I have argued that the outcomes are the result of strategic interaction among goal-oriented actors.

The rational choice analysis of politics has been intensively critiqued for being too theory-driven hence risking that evidence is selected and tested in a biased fashion, or that conclusions are drawn without serious attention to competing explanation. The empirical power of rational choice theory rests heavily on empirically evaluating key assumptions - such as preferences, game setting, and information - and conclusions of the model (Morton 1999, Bates et. al. 1998, Scharpf 1997, Elster 2000). The next table summarizes the various approaches of empirical valuation applied in the different case studies (see chapter 4 for details).

Table 7.1 Empirical Valuation of the Case Studies

<i>Empirical Valuation</i>	<i>Chile</i>	<i>Sweden</i>
Preference assumptions	No	Yes
Game assumptions	Yes	Yes
Information Assumptions	Yes	Yes
Alternative Explanations	No	Yes
Predictions and “New Facts”	Yes	Yes

Although the theory driven analysis in previous chapters might pose some potential problems (e.g. Elster 2000, Walt 1999), I would like to start by highlighting two of its benefits.

First of all, the use of game theoretical reasoning has allowed us to identify critical institutional differences that generate outcomes across the studied cases. Considering the rather wide differences between the cases and the number of potentially interacting explanatory variables, the game theoretical analysis was able to guide both the theoretical and empirical analysis (see Scharpf 1997).

Second, the analysis managed to highlight some new facts that would not have been possible without a game theoretical analysis. In the Swedish case, I was able to identify previously avoided distributional conflict, and the strategic interaction water users are part of when trying to tackle water related environmental problems such as floods and nutrient leakage. In Chile, the analysis was able to identify the fundamental role the institutional context plays in defining the social impacts of water privatization, and the ambiguous role of information for the incentives underprivileged water users face in challenging water rights violations.

Two Remaining Problems

Some problems do nonetheless remain. One worth highlighting has to do with the simplified assumption that the strategic interaction actors face can be captured using simple two-player matrixes. More precisely, the potential - and in fact even likely - impact of coalitions is not analyzed in detail in the case studies. Though not assumed in the preceding chapters, there are several fruitful options here. The alternatives range from studies that focus on the dynamic process that lead to the solution of bargaining problems, to models that include or exclude side-payments, belief revision, complete, perfect or imperfect information etc (e.g. van Deemen 1991, Tohmé and Sandholm 1999, Axelrod et. al. 1995). Game theory has nonetheless been unable to explain or predict which coalitions will emerge when a game is played (Allen 2000:147). This poses a serious challenge for the use of game theoretical reasoning in empirical studies.

The second issue has to do with the difficulties in formulating a more general theory of bargaining resources. Put bluntly, while bargaining resources are likely to play an important role in defining the outcome of strategic interactions, it is nonetheless difficult to specify what exactly constitutes these resources in all, and often rather intricate empirical settings. Consider the extensive analysis of how bargaining power affects the emergence of institutions assumed by Knight (1992:130-144). Though the main factors that constitute social actors' bargaining power is extensively discussed, applying these insights in empirical research still forces us to analyze and assess this power in a far more inductive manner than expected by a rational choice based approach to political analysis.

I would like to recapitulate the earlier argument that no framework or model is able to capture the full richness of the considerations participants face in empirical settings. The ambition has instead been to illustrate the major underlying problems that participants face (c.f. Ostrom 1995:129).

Getting a Grip of Complexity

While the analysis in the preceding chapters has been able to point out what determines the selection of one specific equilibrium, the real world is of course never that simple. On the contrary, the political landscape is ever changing, showing continuous emergent phenomena. This perspective - based on viewing the world as complex systems that constantly evolve and unfold over time - seemingly poses some fundamental, but very interesting patterns for scientific theories such as economics (e.g. Arthur 1999). This perspective opens up some

interesting issues for political scientists, and is likely to be addressed by researchers specializing in natural resource management institutions (e.g. Ostrom 2005, Rova 2004, Galaz 2005c). I would like to highlight some of its implications for the analysis assumed in previous chapters.

If bargaining resources are to provide the fundamental drive for institutional emergence and change, (see Knight 1992, Korpi 2001, Klein 1987, Sebelis 1990:110-118), there seems to be a need to advance a more dynamic theory of bargaining resources. By that I mean that we should try to identify the factors that *with time* strengthen, maintain or undermine powerful or powerless actors bargaining resources (c.f. Payton Young 1998). These factors are not necessarily only institutional, but are likely to be the result of technological, economical, ideological or ecological processes beyond the direct control of actors.

Allow me to exemplify. Consider the case of the Chilean peasant community in one of the empirical cases. Though the analysis advanced here manages to display the vulnerability of the community, it is not able to capture the fact that globalization in terms of the export boom advanced by the Chilean government, is radically transforming the characteristics of the community and in the end their bargaining resources. In the Swedish case study, the fact that the European Union is in the process of harmonizing the member countries water regimes to meet the future challenges of economic development and environmental change, is one factor that is likely to radically shift the bargaining position of various actors.

Without getting to detailed on this point, present developments within agent-based modeling provide an interesting possibility to understand how actors act in more complex settings (e.g. Janssen 2002, Cederman 1997), and could be integrated with the bargaining approach presented here (as suggested in Pritchard and Sanderson 1999). This does not however, diminish the continued need for studies that are able to combine rich narratives with analytical models to understand the complex link between heterogeneity and institutional emergence and change (c.f. Scharpf 1998, Ostrom 2005).

In a more transdisciplinary context, linking non-cooperative games and bargaining theory with current advances in the study of linked and complex adaptive social-ecological systems (e.g. Gunderson and Holling 2002, Berkes et. al. 2003) might provide a fruitful cross-fertilization. By this I mean that both fields might benefit from elaborating how factors such as distributional conflict, private information and the possibility of posing credible commitments in strategic interactions between social actors (c.f. Miller 1992, Schelling 1960, Raiffa 1982), is affected by highly dynamical ecological systems characterized by uncertainty, non-linear behavior and surprises (Levin 1998, Gunderson and Holling 2002). I see no reason why the analysis assumed in the preceding chapters

could not be integrated in current research of linked and complex adaptive social-ecological systems (see Galaz 2005a for an example).

Again, these are only tentative suggestions, and this is neither the time nor place to expand on the issues. They should nonetheless be considered as interesting paths explore in our search for a greater understanding of why, how and - as discussed extensively in earlier chapters - on whose terms humans manage to cooperate.

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Documents

Chile

- Document 1. Court Ruling. "Poder Judicial Buin, Corte de Apelaciones de San Miguel. Court ruling N° 57.159-3, dated 2003-06-08".
- Document 2. E-mail letter from Juan Fco. Zaricueta, Programa de Acceso a la Justicia (PAJ Buin), to Julio Abufom, INDAP Metro. Subject: "Informe juicio criminal Buin (Las pataguas de Valdivia de Paine)", dated 2004-03-15.

*Sweden**

- Protocol 1
- Protocol 2
- Protocol 3
- Protocol 4
- Report 1
- Report 2
- Report 3
- Survey 1

* Documents from the Swedish case study are presented without name or title to secure the anonymity of the interviewees.