Sustainable Water Management through User Participation

- A field study in rural Maharashtra, India

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Sustainable Water Management through User Participation

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Långsiktigt hållbar dricksvattenförsörjning genom brukardeltagande

- En fältstudie på landsbygden i Maharashtra, Indien

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Summary

This research project deals with the topic of drinking water provision in rural Maharashtra, where availability of suitable drinking water is a major difficulty for the rural population.

The focus is on hand pumps. These resource systems have been provided as tax financed public goods by the central government. The central government has shown insufficient capacity to maintain this infrastructure. In this thesis decentralization of management of the resource system is discussed. The aim of this study is to compare two water management regimes, the centralized government regime and a community based management regime. The purpose is to identify the key determinants for establishing sustainable drinking water management in rural Maharahstra.

The theoretical approach is a comparative institutional analysis of two management regimes based on common pool resource theory. The study is mainly conducted through focus group interviews with users and village level administration in thirteen villages. Thus, the empirical material is mainly qualitative data.

The conclusion is that the NGO´s approach is an example where social mobilization efforts have been successful in establishing a new institutional setting where local actors successfully manage their resource system. This management regime appears preferable if one look to rural communities outside larger villages. In order to achieve this, a wider social mobilization effort in order to build social capital of the community is needed to secure sufficient participation. In these communities one can find ”social entrepreneurs”, people with leadership capacity and ideas about the development of their village, that will keep the user group active in maintenance if the level of social capital is sufficient.

Finally, I found that letting users demand of maintenance capacity determine the amount of maintenance capacity supplied would probably increase the efficiency of the studied program and similar programs.

Key terms: Participation, Water management, Development economics, Common pool resource, Rural India.

Sammanfattning

Tillgången på dricksvatten på den indiska landsbygden är ett problem. Framförallt saknar de fattigaste invånarna tillräcklig tillgång på rent dricksvatten. Denna studie behandlar en del av denna problematik i delstaten Maharashtra.

Under de senaste årtiondena har infrastruktur för vatten tillhandahållits av staten som skattefinansierade offentliga varor. Då statens kapacitet att underhålla dessa system brister är det intressant att se på alternativen. I denna uppsats diskuteras resultatet av decentralisering av förvaltning och ägande av dessa resurser genom aktivt brukardeltagande. Vattenförsörjningssystemet i byar där decentralisering genomförts, med hjälp av en ideell organisation, jämförs med situationen då staten äger och underhåller resurssystemet. Syftet med studien är att jämföra de två systemen och identifiera de faktorer som avgör om den nya förvaltningsregimen blir långsiktigt hållbar.

Studien utgår från institutionell ekonomi och baseras på ”common-pool resourse” teori. Den huvudsakliga metoden för datainsamling är fokusgrupper med brukare och den lokala administrationen i tretton byar. Således utgörs det empiriska materialet till största delen av kvalitativ data.

Slutsatsen är att lokal förvaltning är att föredra om vi ser till fattiga samhällen utanför större byar på den indiska landsbygden. En extern aktör kan forma lokala institutioner, som ger långsiktigt hållbara system för underhåll av handpumpar i dessa samhällen. För att lyckas med detta krävs tillräckligt brukardeltagande, inte att alla brukare deltar i underhåll. Vidare behövs förstärkning av det sociala kapitalet hos brukarna för att uppnå tillräckligt deltagande. I samhällena finns ”sociala entreprenörer”, personer med ledaregenskaper och vilja att utveckla byn, som kommer att hålla brukarorganisationen igång förutsatt tillräckligt socialt kapital.

Genom att låta den lokala efterfrågan inte bara styra antalet brunnar som installeras, utan även avgöra hur underhållskapaciteten byggs ut, borde effektiviteten i det studerade utvecklingsprogrammet och liknande program kunna ökas.

Nyckelord: Deltagande, Vatten, Utvecklingsekonomi, Landsbygdsutveckling, Indien.

Abbreviations

BDO	Block Development Officer
CCT	Continues counter trenches
CHV	Community Health Volunteer
CIA	Comparative Institutional Analysis
CPR	Common-Pool Resource
DO	Development Officer
HCC	Hindustani Covenant Church
MCCS	Mission Covenant Church of Sweden
NGO	Non Governmental Organization
PRA	Participatory Rural Appraisal
Sida	Swedish International Development Agency
SMU	Mission Covenant Youth of Sweden (Svenska Missionskyrkans Ungdom)
SWS	Solapur Water Service (before 1990 Solapur Well Service)
PME-desk	Project Monitoring and Evaluation desk
UNDP	United Nations Development Program

Glossary

Gram Panchayat	Elected governing body of a village
Gram Sabha	Village assembly
Panchayat Samiti	Elected governing body of a Taluka
Pion	Employee of the Gram Panchayat
Sarpanch	President of Gram Panchayat
Taluka	Administrative level in-between district and village
Zilla Parishad	Elected governing body of a district

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1. Introduction

The focus of this study is the question of how to ensure sustainable drinking water provision in rural India. People's access to safe drinking water is crucial for economic development, development that means something more than economic growth. As economist Amartya Sen, a leading thinker on the meaning of development, claim: economic growth cannot be an end in itself. Instead he argues that capability to function is what really matters for status as a poor or non-poor person (Sen 1999, pp. 127-134). Sen exemplifies this: someone with a parasitic disease, in comparison with a healthy person, will be less able to extract nourishment from a given quantity of food (ibid.). Thus income is not the only relevant measurement of economic development. Empirical evidence show that increased income does not automatically lead to health improvements (Todaro & Smith 2003, pp. 366-367). Unsafe drinking water is responsible for a substantial part of the disease[1] burden in the world. Waterborne diseases are responsible for 35 percent of the death of young children in Africa, Asia and Latin America, these would soon be eliminated with safe water supply (Todaro & Smith 2003, p. 55).

In addition, it is also reasonable to believe that economic growth is hindered by lack of suitable drinking water through at least two channels (Todaro & Smith., p. 400). First, an unhealthy weak person is not as productive as a healthy stronger person. Second, long distances to access drinking water make women[2] in developing countries spend several hours per day collecting water, time that could be spent more productively if water access was extended. Consumption of water also drops significantly when it has to be carried for more than a few minutes, which adds on the negative health effect (Sida 2004, p. 12).

To improve the livelihoods of poor people one thus need to pay special attention to drinking water provision. Why water access to all has not been realized have some ecological explaining factors, but management issues seem to be at least equally important. Safe drinking water is a natural resource which, in many areas of the world, demands some technology to extract and with that comes some implications identified through economic theory. In economic terms the above described effect of higher consumption of good quality water could be regarded as positive "externalities" and the technology needed could have characteristics of "economics of scale". Both these characteristics could give governments reason to intervene[3].

The donor community financing water programs support approaches to include the final users as important participants in water management (see e.g. World Bank 2007; Sida 2004). This is also supported by economic research (Finsterbush & Wicklin 1989[4], Isham et. al. 1995, Isham & Kähkönen 2002) that measures correlation between participation activity and project results. But economist are also aware that people trying to act together could be subject to "free-riding" problems and some scholars focus on what institutional factors that determine when local management of resources becomes sustainable and highlights the importance of adapting strategies suitable for the local circumstances (Baland & Platteau 1996; Ostrom 1990; Wade 1988).

[1] Diarrhoea, dysentery, typhoid, worms, jaundice and cholera (Narain 2006, p. 2).
[2] Women are the primary water collectors in most rural households (World Bank Group 2007).
[3] These concepts will be developed later on in the thesis.
[4] Not specific to the water sector.

This essay focuses on rural India. In 2004 more than 70 percent of India's then 990 million people lived in half a million rural villages where waterborne diseases were a major health problem (Sida 2004, p. 10). This empirical case study covers a church based NGO, Hindustani Covenant Church (HCC), and this organisations involvement in drinking water management in the rural areas of western India in the state of Maharashtra. HCC organize and educate village people to participate in the process of installing new bore wells with hand pumps and repair old ones and then hand over the responsibility of maintenance to the local community.

HCC is, expressed differently, pursuing a participatory strategy and this case study will focus on what can be learnt from this NGO regarding what practices gives effective sustainable community based drinking water management when replacing a government run, more centralized, water management regime in the same area. This paper examines the results of available academic experience of user participation in management in combination with the empirical investigation in Maharashtra.

1.1 Aim

The aim of this study is to compare two water management regimes, the centralized government regime and a community based management regime. The purpose is to identify the key determinants for establishing sustainable drinking water management in rural Maharahstra. It is a comparative institutional analysis which treats government run management as the prevailing institutional regime and the NGO activities as a shock[5] to that system that will take it to a new institutional equilibrium[6].

In this paper I define sustainable drinking water management as when users are satisfied with the functioning of the hand pump and there exists an institution for maintenance of the hand pump some time after program implementation.

The sub objectives are:

- to outline the institutional setting of the previous management regime
- to outline what type of user participation this particular NGO-program facilitates
- to explore what role area specific characteristics has in determining sustainability of a local management regime
- to determine the sustainability of the new management regime compared to the previous.
- to determine which the key elements are to establishing sustainable community based drinking water management in the area.

[5] I here use the term shock as it is used in the standard economic modelling sense, as a factor externally introduced affecting the modelled variables. Previous use of similar vocabulary within CIA can be found in i.e. Aoki (2005), p. 3.

[6] By institutional equilibrium I mean when the agents new action become mutually consistent and repeatedly implementable (Aoki 2005, p. 6)

1.2 Delimitations

My focus is on drinking water management. This means I do not study water management in full; I do not include various types of water harvesting or water shed activities[7]. Neither are domestic waste water solutions nor other sanitation issues included in the study, even if those are important to be able to see positive results from the new bore well in terms of improved health. This because I chose to focus this study on factors that affect people's participation in maintenance directly.

Regarding drinking water provision I focus on institutions and incentives for management. This means I do not put that much attention to different technical solutions[8] for provision of drinking water or geological, ecological and various other environmental aspects. I also choose to focus on the issue of the neediest people living scattered outside the villages or in hamlets in rural areas[9].

The introduction explains the importance of suitable drinking water as being one source for improved health and time saving on an unproductive activity for the rural women. This relationship is not studied in this paper, because I find it already established by previous research (Isham & Kähkönen 2002, p. 670; Sida 1999)[10].

[7] This is done, well aware of the policy consensus, stated in the Dublin principles, of the importance of Integrated Water Resource Management (IWRM) to ensure sustainable and multifunctional use of fresh water resources (SIDA 1999, p. 1). The reason for this delimitation is to limit the complexity of multiple stakeholders so a reasonable research design can be established.

[8] I focus on hand pump provision without putting into question if hand pumps are the best alternative. Kolsky et.al. (2000, p. 3) estimate, in their Indian study, hand pumps to be more cost-effective on per capita basis for communities with fewer than 4500 people. Also other arguments speak in favour of hand pumps, e.g. Narain (2006, p. 8) has concluded that electricity pumps worsen the problem with lowering water table due to overuse.

[9] See section 4.1 for an explanation on these concepts.

[10] Isham & Kähkönen's study shows that the average reported time saving in the studied water project in Maharashtra was 53.9 minutes per day and the average reported decrease in cases of diarrhoea was 20 % (Isham & Kähkönen 2002, p. 670).

1.3 Method

The method applied in this thesis is comparative institutional analysis (CIA) regarding two rural water management regimes, based on a qualitative field study in the state of Maharashtra, India.

1.3.1 CIA basics

The major level of study in CIA is institutions. Aoiki (2005, p. 7) define an institution as "self-sustaining, salient pattern of social interaction, as represented by meaningful rules that every agent knows and incorporates as agents´ shared beliefs about the ways how the game is to be played". Development possibilities of the economy are determined by institutions that build an economic order by co-ordinating actors´ behaviour (Solari 2007, p. 23) or putting constrains on actors' behaviour (Greif 1998, p. 80). The comparison of economies allows scholars using the CIA approach to discover these institutions and their importance.

Assuming rational choice within a set of rules leads to a simple maximation problem under the constraints of the rules (Solari 2007, p 5.). A starting point of CIA is that people have limited or bounded rationality (ibid., p. 2). Bounded rationality is the limits in the capacity of individual agents to objectively analyze the structure of the game (Aoki 2005, p. 6). In this game multiple equilibrium are likely to exist in a given strategic situation (Greif 1998, p 81).

1.3.2 CIA applied

Within the CIA framework it is also possible to compare different institutional arrangements in a single society at different points in time (Solari 2007, p. 4). Different factors can trigger a crisis of an existing institution, and the agents can transit to a new institution (Aoki 2005, p. 3). This transition is:

> *"a process in which they revise their individual expectations about how the game is played and eventually reach a modicum of common expectations with the help of ideological and entrepreneurial factors as well as past legacies" (ibid., p. 3).*

In this process social, political, economic and organizational factors interact (ibid., p. 3). This also becomes a competition between searches for new types of playing on the one hand and efforts to preserve the existing pattern of playing on the other (ibid., p. 23). Institutions of shared behavioural beliefs need to be reconstructed (ibid.). If limited rationality is assumed "an institutional change involves a change of context for action, but also a change in attitudes" (Solari 2007, p. 5). All this imply that an institution cannot be changed just by the government laying down a new law, people have to believe in the changed policy and change their behaviour to make it an institutional change (Aoki 2005, p. 9).

An organization can alter the set of the relevant rules of the game by constituting a new player, this can for example be the introduction of the bank that provides credit opportunities for new investments that was not possible before (Greif 1998, p 81). In this paper the studied NGO constitute the new player that introduce the shock to the institutional setting. The compared systems in this paper are the centralized water management regime and the HCC introduced local management regime. The functioning of water management in the villages before HCC started their work is in the analysis considered a stable equilibrium

outcome due to the existing institutional setting. First the basics of this system were identified[11]. HCC activities have then been analyzed as an externally introduced shock to that system, which then arrives at a new outcome. In this study I analyze if this new outcome is stable over time and what variables have been affected by the NGO.

Any comparison involves the setting up of criteria for comparing. One need to reduce complexity of economic interaction and therefore a framework to achieve a structuring of phenomena is needed (Solari 2007, p. 8). Scholars in each sub-discipline within CIA consider some things exogenous to their modelling (ibid., p. 23). The criteria I use are directly taken from Common Pool Resource (CPR) theory presented in the theory chapter of this paper.

The village is considered the analytic entity and the gathered empirical information is therefore put together in syntheses of the condition in each village. These syntheses are then systematically compared in-between villages (see appendix 2 and 3). The purpose of the systematic analysis is to identify significant differences between project and non-project villages (an induced change in the economic system), and what differences there are between project villages (mixed results of the NGO:s approach).

A presentation on the practical method applied to collect the data is presented in chapter four.

1. 4 Outline

The outline of this thesis is as follows, and illustrated in figure 1.1. Chapter two will present the theoretical framework; economic arguments for public provision of goods, and decentralization of the provision lay the foundation for introducing common-pool resource theory (CPR) in general and a specific economic framework for the water sector. Since the models applied are not within the mainstream of economics I have chosen to have a rather long theoretical presentation. In chapter three the method is presented in more detail.

In chapter four to six I present the empirical material. In chapter four the Indian context is introduced, focusing on some selected topics. In chapter five I present the findings of the project cycle of the water project. In chapter six I give the findings of village characteristics indicated important by CPR theory.

In chapter seven the empirical material is discussed in relation to the research question and the theoretical framework. In chapter nine I summarize the conclusions.

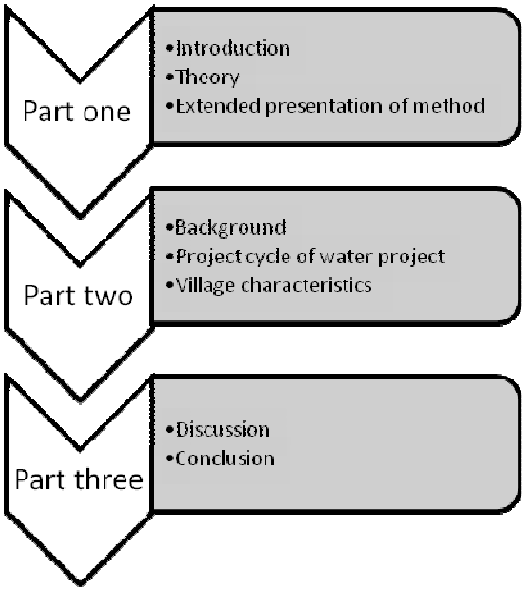

Figure 1.1 Outline of the thesis

[11] A social system is defined as a set of linked institutions, which are called institutional arrangements.

2. A theoretical perspective

Economic theory recognizes that free markets do not always achieve the most efficient outcomes, externalities can be present. One of the solutions to increase efficiency is, according to traditional economics, that the state intervenes as the provider of the good. This is the case in India where the state provides subsidized water for household consumption.

Decentralization, in the development discourse framed in the concept of user participation, is argued to increase results and efficiency of public goods provision. Common pool resource (CPR) theory is a suitable framework for analyses of can under what circumstances community management of a resource becomes sustainable.

2.1 Externalities and different types of goods

The good of interest in this study is suitable[12] drinking water. For the scattered rural households covered by this study the possible suitable drinking water is water extracted from the ground water. To extract ground water a man-made structure is needed: a bore well with pump. The bore well with pump will in the rest of this study be called the resource system (in line with Ostrom (1990, p. 30))[13].

The quantity of each good produced and the price at which it is sold is in market economies determined by the forces of supply and demand (Mankiw 2004, p. 63). In a perfectly competitive market the market forces will achieve the most efficient[14] allocation of resources (ibid., p. 146). But sometimes one actor's activity influences the well being of a bystander, this is called an externality (ibid., pp. 204-207). When externalities are present the free market will not produce the most efficient outcome (the actor taking the decision does not account for the effect on others). Externalities can be both positive and negative. A positive (negative) externality is when some activity yields benefits (harm) to a third party. The market failure can then be corrected by the government by inducing the actors to internalize the externality by e.g. subsidizes (taxes).

Another way to characterize goods in traditional economics is in four typologies; private goods, natural monopolies, public goods and common resources (Mankiw 2004, pp. 224-226). The grouping of goods in these categories is done according to two characteristics; if the good is excludable (people can be prevented from using it) and if it is rival (one person´s use diminishes another person's ability to use it). Figure 2.1 presents the typological classification of goods.

		Rival	
		Yes	**No**
Excludable	**Yes**	Private Goods	Natural Monopolies
	No	Common Resources	Public Goods

Figure 2.1 Four types of Goods
Source: Mankiw (2004, p. 224)

[12] By suitable I mean drinking water of enough quality to limit the spread of water borne diseases.
[13] The resource system can be viewed as the entire groundwater basin, but for this study I choose to restrict the view of the resource system to the well and the ground water source in reach of the pump.
[14] Efficiency is when total consumer and producer surplus is maximized. See Mankiw (2004, p. 148) for a further introduction.

An intervention in the market can increase efficiency if the good belongs to any other classification than the private good. The good studied here is not easily classified; it has characteristics of the natural monopoly, the common resource, and the public good.

It has a high fixed cost for installation of the service and a very small marginal cost of additional users (economies of scale) and could thus be viewed as a natural monopoly (which is Mankiw's suggestion regarding drinking water). This implies that for efficiency reasons a government intervention can hinder that the price is set too high by a monopolist.

But as stated above the good has also externalities: good water provision to households is important for the society at large (as argued in the introduction) and therefore one could argue that it should be subsidized. The state can therefore decide to provide it as a public good that no one is excluded from.

The resource of ground water is not abundant if the whole system is considered. If the well is scarce of water but is not excludable it is a common resource, a common resource has the characteristic of being rival. Under such conditions there may be a need for restricting the use.

These characters of the good have made governments around the world provide water services. The two providers[15] in this study, the Indian government and HCC, have also come to the conclusion that water for household consumption has such characteristics that justify subsidized provision of the good[16]. The economy as a whole benefit of increased consumption of the good. But how does public provision become most efficient, let's turn to that issue now.

2.2 Decentralization and the concept of user participation

Private owners are thought to have the best incentives to minimize costs of production in contrast to bureaucrats in the state apparatus that may become a special-interest group and block cost-reducing reforms (Mankiw 2004, p.331). Decentralization is however suggested to increase appropriate incentives when a good is publicly provided (Todaro & Smith 2003, p. 714-715). Especially when the services are supplied publicly for efficiency reasons and are only utilized by local residents, there is little reason for not letting the local government make decisions on these issues. Local governments are closer to the problems that need to be solved and they have therefore better possibilities to make supply meet local preferences (Boadway 2003, pp. 4-5). They are believed to have an advantage in information and are more responsible to the voters (ibid.). A major motivation of the central government (when decentralization is introduced) has also often been to share fiscal burdens with regions.

In development economics the concept "user participation" is also introduced, it means different measures to make development programs more responsive to the demands and needs of the users, thus in line with decentralization. Provision of public goods can become more effective if the public participate in

[15] I follow Ostrom's distinctions of "providers" as those who arrange the provision and "producers" as those who actually construct, repair etc (Ostrom 1990, p. 31). Often both the provider and the producer are found in the same actor but the provider can also restrict its action to financing and design.

[16] The reasons include those given in the introduction regarding implication for increased health etc.

the process of decision making, construction, operation and maintenance[17] (Montgomery 1983, p. 90). Participation means some sort of inclusion of the user/local community in management[18] but does not necessarily demand a federal political system.

Montgomery (1983, pp. 97-98) put up what he calls a "sensitivity hypothesis" to explain what programs for delivery of public goods that benefits most from user participation. These programs are those where "local effects are variable", "have to be made frequently but not routinely", "require quick response from the public" and those whose "impact calls for major changes in the behaviour of the public". All criteria apply to water programs.

There are over 400 participation tools[19] and research has shown that there cannot be said to be one right participatory method to use (Mikkelsen 2005, p. 69). Different types of projects and different contexts have different demands. For analytical reasons one can deconstruct participation in more detail: Stakeholders can be identified, the project cycle can be identified (project design, implementation, operation and maintenance) and the extent of stakeholders' participation in each stage can be clarified (ibid.).

2.3 Common-pool resource theory

The experiences of how well the decentralized community management works differ widely. Researchers advocating participatory strategies have early indicated that attention needs to be given to context. Finsterbusch & Wicklin (1989, p. 591) states that "the impact of participation differs significantly by type of project and societal context".

Empirical research on how local institutions are coping with common management of resources has have lead to the creation of common pool resource (CPR) theory. CPR theorists put up criteria regarding under what circumstances small communities of resource users can create management regimes that help them allocate benefits equitably, over long time periods, and with only limited efficiency losses (Agrawal 2001, pp. 1649-1650).

CPR theory focuses on small-scale resources. Ostrom (1990, p.261) define small-scale as ranging from 50 to 15 000 users. According to Ostrom (ibid., p. 30) CPR is defined as "a natural or man-made resource system that is sufficiently large as to make it costly (but not impossible) to exclude potential beneficiaries from obtaining benefits from its use". Wade (1988, p. 183) sees common resources as a sub-set of public goods, those public resources that are "subject to congestion, depletion or degradation".

But Wade also includes resources where the problem is not so much congestion as the externalities (Wade 1988, p. 184). According to Wade empirical findings also shows the existence of voluntary contributions to public goods, beyond natural resource management (Wade 1988, p. 199). And Ostrom conclude:

[17] There are also some objections towards user participation (Todaro & Smith 2003, p. 716): First, mechanisms for genuine participation are in most cases not in place and establishing them takes time when action is needed immediately. Second, "if you are too unhealthy and unskilled to participate in the world economy, you are probably not able to effectively participate in development projects either". Third, time is money and the poor are busy trying to survive.

[18] In the literature you can also find the other terms used synonymously; e.g. local participation, community participation, beneficiary participation, and participation of stakeholders.

[19] A participation tool is the instruction on how to carry out a specific session in the development program, for example it can be guiding the village in a session during which villagers graphically construct a map of the resources available for them.

"Given the similarity between many CPR problems and the problems of providing small-scale collective goods, the findings from this volume should contribute to an understanding of the factors that can enhance or detract from the capabilities of individuals to organize collective action related to providing local public goods."
(Ostrom 1990, p. 27)

"These [problems] have to do with coping with free-riding[20], solving commitment problems, arranging the supply of new institutions, and monitoring individual compliance with sets of rule."
(Ostrom 1990, p. 27)

I therefore feel comfortable applying this theory to the problem of this thesis without being able to clarify to what degree drinking water is rival. I also choose this theoretical framework over alternative theories that deal with local provision of public goods such as "club theory" (see Scotchmer 2002) or theories of "optimal federalism" (see Rosen 2004) since I believe CPR theory to be more suitable for the developing countries where more market imperfections exists.

2.3.1 The prisoners' dilemma

At hart at analyses of collective actions lies the prisoners' dilemma. The starting point of CPR theory is perhaps best viewed as a criticism of a too simple analysis of this dilemma.

To explain the prisoners' dilemma let us picture a situation where there are rules restricting overuse of a resource for sustainability reasons. The prisoners' dilemma applied as explained by Wade (1998, pp. 200-204) works as follows:

"Each individual has a clear preference order of options:

(i) everyone else abides by the rule while the individual enjoys unrestricted access (he free rides);
(ii) everyone, including himself, follows the rule;
(iii) no one follows the rule;
(iv) he follows the rule while no one else does" (Wade 1998, 201).

The third outcome becomes the "stable group outcome" with these preferences. Cheating, the first alternative, is the incentive for each individual which makes the whole community to arrive at the third alternative. The cheating at least avoids the worst alternative that is being the only one that follows the rule.

There are two theoretical options to avoid overuse: Turn the resource over to private owners, who then have the incentive not to overuse, or put coercion from outside by the government. Rational people cannot achieve rational outcome alone because what is rational for an individual in this game is irrational for the collective as a hole.

[20] Free-rider problems is whenever people cannot be excluded from the benefits others provide (Ostrom 1990, p. 6).

But the game is only played this way if one imposes some restrictions. The players must be ignorant of what the others choose and s/he is restricted to choose only once. The first assumption makes it impossible to negotiate to change the rules of the game. But the basics of CPR theory is that if the players know that the game will be played repeatedly there is a chance that they will cooperate today in hope of that others will then follow. If people can negotiate they can introduce penalties for violating agreements etc. Without these two restrictions the more rational strategy is thus to cooperate first and defect if other defects. In a more complex situation considerations of morality, power, and loyalty also restrain free-riding.

Advocators of CPR theory have found empirical evidence for cases where local communities do overcome the prisoners' dilemma and build community responses to achieve more efficient outcomes. According to Wade (1988, ch. 11) the situation regarding village resource use resembles more the situation that make rational choice-makers cooperate than it resembles the situation of the "prisoners' dilemma". In a localized small scale physical setting where individuals repeatedly communicate and interact with one and other Ostrom says:

> *"It is possible that they can learn whom to trust, what effects their actions will have on each other and on the CPR, and how to organize themselves to gain benefits and avoid harm."*
> (Ostrom 1990, p. 184)

According to Ostrom:

> *"The commitment is to follow the rules so long as (1) most similarly situated individuals adopt the same commitment and (2) the long-term expected net benefits to be achieved by this strategy are greater than the long-term expected net benefits for individuals following the short-term, dominant strategies."*
> (Ostrom 1990, p. 186)

How individuals weight their own assessments of benefits and costs will depend on the norms that they internalize and the discount rate[21] that they utilize (ibid., p. 206). Coleman, cited in Ostrom (ibid.), distinguishes between norms that are internalized (guilt, anxiety, lowered conceptions or self-worth), and shared norms where sanctioning for nonconformity comes from others who are part of the same group and exhibits social displeasure if a norm is broken (ibid.). Ostrom argues that monitoring and graduated sanctions are necessary so enough people will follow the rules and extensive rule-breaking is not triggered (ibid., p. 187).

[21] Benefits expected to be received in the future is thought of less value than benefits today (Ostrom 1990, p.34).

2.3.2 Enabling factors for sustainability

> *"What remains unexplained is how some appropriators overcome, and others do not overcome, the problems associated with collective provision of delicately calibrated institutions that create institutions in which individuals find it advantageous, credible, and safe to pursue contingent commitments to rule compliance and mutual monitoring."*
> (Ostrom 1990, p. 187)

There are two parts of CPR theory: Conditions relating to why these situations appear and conditions for sustainability (Wade 1988, p. 188). The second set is the focus for this study. There is yet to be formed a coherent theory for CPR. Empirical research up to date can only suggest a list of prerequisites, mainly institutional variables, which enable sustainable CPR management. A synthesises of the present stance of CPR theory is found in an article by Arun Agrawal (2001). It is a summary of three book-length empirically based studies in this genre, namely Wade (1988), Ostrom (1990), and Baland & Platteau (1996). He also compares the findings of the three scholars to more literature. In his critique of CPR theory Harris (2003, p. 2) agrees on these three publications to be the "main point of reference in the field"[22].

Agrawal's research summery within the CPR paradigm is presented in appendix 1. He presents four areas that one needs to consider and the relationships in between them, see figure 2.2.

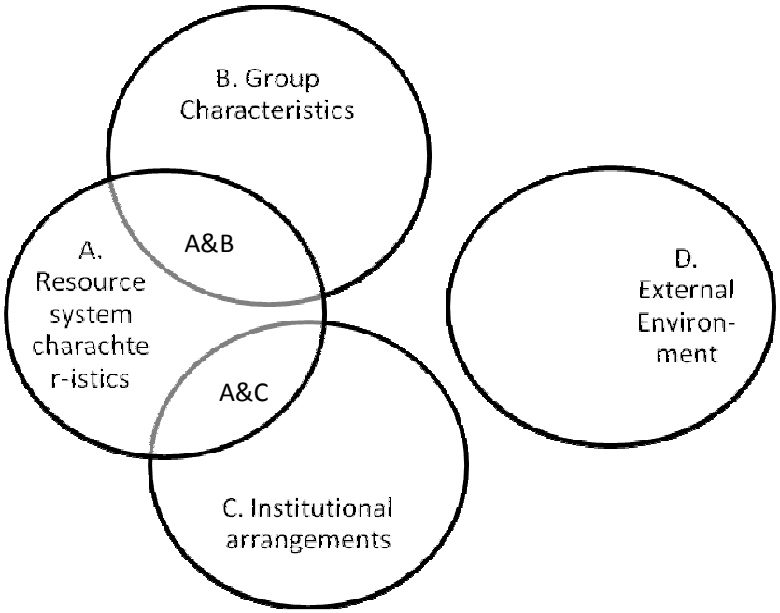

Figure 2.2 Analytical spheres of CPR theory
Source: author's graphical presentation (based on Agrawal 2001)

[22] According to Harris (2003) many scholars are still critical to the state agencies or NGO:s' abilities to craft institutions such as water users associations. The many scholarly objections seem to come mainly from anthropologists and are "the typical of anthropologists' criticism of the economistic, instrumental rationality" as Harris puts it. He suggests that focus should be on the analysis of power relations.

First, one needs to consider the *resource system,* which means things like the size of the resource and its predictability. Second, the *group characteristic,* which means things like clarity of group boundaries, level of social capital and types of leadership in the group. Third, *institutional arrangements,* which means things like rules and how they are monitored and sanctioned. Fourth, the *external environment,* which means the local communities relations with the state and with the external markets. Important are also some matches between the resource system and the group characteristics (for example the group dependence of the resource) and the matches between resource system and institutions (for example restrictions on harvest of the resource needs to match the resource capacity).

I will exemplify this applied research by shortly presenting one aspect: moral norms of the group. This is included in category "group characteristics". Balland & Platteau (1996, p. 125) explain the importance of norms by that:

> *"when norms are well established and effectively sustained through appropriate secondary socialization process, people tend (a) to adopt to the other's viewpoint when making decisions that may harm others´ interests and to feel internally rewarded when behaving in other-regarding ways; (b) to be confident that others will abide by the same code of good behaviour as themselves; (c) to cling to this code even when they had unpleasant experiences in which they were suckers; (d) to feel quality after they have (perhaps mistakenly) deviated from the moral rule: and (e) feel vengeful and willing to punish detectable free-riders (and perhaps also people who refuse to do so and continue to entertain good relations with the free riders)."*
> (Balland & Platteau 1996, p. 125)

Balland & Platteau also writes that "monitoring problem does not even arise if moral rules are backed by religious beliefs according to which gods knows everything about all our actions" (ibid., p. 126). When people see a better next or future life they are not easily discouraged by bad experience.

To summarize, CPR theory gives a framework for analyzing each specific situation of local management of a common resource. At interest is under what circumstances people overcome the prisoners' dilemma and free riding is deterred. I will now try to narrow this framework even more by only considering the rural water sector.

2.4 Economic framework for projects in the rural water sector

In this section I will specify the analytical framework applied in this thesis. Three larger, rather resent, studies on water management in the Indian rural water sector form the starting point, together with the theoretical discussion presented above.

Manikutty (1998) conducts a comparative study of five water and sanitation projects in India. All these projects have incorporated community participation at some stage. The study was based on a purposive sample of villages in order to find common determinants for project turnouts. In each village care takers, village leaders and community members were interviewed, both by questionnaire and open-ended questions. Also project officials and project documents were consulted. Manikutty concludes that participation differed along two basic dimensions; the intensity of participation and the sustainability of participation. He argue that participation must be planned and managed and suggests several design parameters.

Kolsky et.al. (2000) evaluate UNICEF´s water and environmental sanitation program in India from 1966 to 1998 by five complementary methodologies: key informant interviews, field visits, participatory user assessment, mail survey of UNICEF partners, and desk reviews of more than 400 UNICEF and non-UNICEF documents. Amongst other things they say that the balance between achievements in quality and coverage is a delicate issue. They also argue in support of community-based management of water supply.

Isham & Känhönen (2002) study the impact and performance of community-based water services by using qualitative and quantitative data from 1 088 rural households and 50 water committees. Their econometric analysis especially shows that social capital has an important impact on community-based water services, but they also argue for some institutional variables found important.

Based on this sector specific economic research one can identify a list of variables being most important for sustainable drinking water management. The list is presented in appendix 1. The study by Isham & Kähkönen (2002) is the one with most clarity on the theoretical framework used. I therefore use their model for this sector as the foundation for my framework. Their framework draws both from a wider selection of research on user participation in development projects and from CPR theory. Figure 2.1 illustrates their model for causal relationships of factors within a drinking water program.

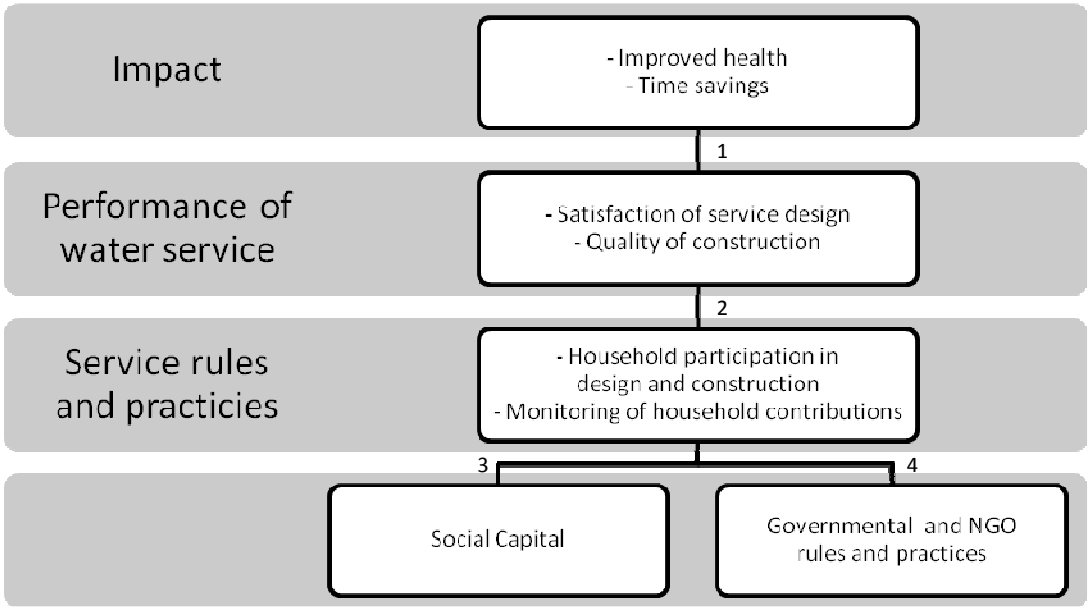

Figure 2.3 Determinants of impact and performance
Source: Based on a figure by Isham & Kähkönen (2002, p. 672)

The impact on improved health and time saving depends on the performance of the water service (link 1). The performance, measured as users satisfaction with the service and quality of the construction identified technically, is determined by service rules and practices (link 2). The most important such practice is that users should be participating in the design and construction phase. The functioning of these service rules and practices are depending on underlying factors of social capital (link 3), and government and NGO rules and practices (link 4).

In this paper I discuss sustainability of the project with the objective to find what government and NGO practices are effective in achieving sustainability in community management regimes. Thus the model can be rearranged and extended for this specific purpose. The interesting depended variable is sustainable management, i.e. performance of water service over time, not health effect. The hypothesis of this paper is that there exists a relationship of variables affecting sustainable management (S) looking like this:

$$S = f(Q_D, Q_C, Q_O) + \mu$$

where the variables included are:

Q_D = Quality of project design
Q_C = Quality of construction
Q_O = Quality of operation and maintenance.

The three variabeles of a project are taken from Finsterbusch & Wicklin (1989).

In my framework Q_D, Q_C and Q_O are endogenous variables assumed to be explained by similar functions; I therefore choose to only specify one function, the function for Q_O. Q_O is a function of how the villagers

participate in operation and maintenance (P_O) and the actions taken by the external agency (A_0). In other words, quality is improved either by the villagers doing something by themselves to improve quality or the government or some other external agency putting in resources to improve quality.

$$Q_O = f(P_o, A_o) + \mu$$

where A_o is an exogenous variable and P_o is an endogenous variable given by

$$P_o = f(G_1, G_2, \ldots, G_n, I_o) + \mu$$

where all G:s are exogenous variables for group characteristics (level of social capital, group size etc.), while I_o is an index variable weighting the institutional settings affecting operation and maintenance (e.g. utility rules and its enforcement). This is based on Agrawal (2001).

Thus, to achieve sustainability in a water program this hypothesis suggests that a suitable level of participation for each stage in the project cycle, and/or direct action from an external agency, is needed. Some group characteristics are believed to be multiplying factors affecting all stages of the project cycle (as social capital in the model of Isham & Kähkönen presented above). Regarding institutional arrangements, these are believed to be different variables affecting participation at different parts of the project cycle. The external agents can directly affect project design, construction, and operation and maintenance.

Resource system variables, identified within CPR theory, are not included since these are assumed to be fixed when only one type of resource system is studied.

The hypothesis presented here is more straight forward than those suggested by Agrawal (2001, pp. 1663 – 1664). He suggests causality between many more of the variables, but I believe it to be a good enough approximate starting point for my discussion without contradicting Agrawal.

The program implementing agency can use very different approaches. To give an example, the agency can use its resources to directly handle some parts of the project cycle, as doing all the maintenance without any participation of the users (affecting E_o) or it can invest resources in capacity building by affecting the group characteristics to enhance the result of village participation. I will use this model for the comparative institutional analysis, studying how village institutions are changed by the NGO:s actions and what the results become.

3. Extended presentation of method

As presented in section 1.3 the method applied in this paper is a comparative institutional analysis. In this chapter the practical methods used to gather the empirical material is presented.

3.1 Literature study

What you have read so far is based on a literature study on participatory water management. In the rest of the thesis I continue to use various literatures to illuminate the discussion on the empirical material. I also use written information from HCC and MCCS, such as the book "Mission i religionernas land"[23] published by MCCS and project plans these organizations present to Sida for economic support. One has to be aware of that this is not an objective source but for the purpose of outlining the basic background I do not think the possibility of positive bias in the material should be seen as a problem. I just regard the information as the view of HCC and MCCS.

3.2 The field study

The major part of the study is carried out as a field study in the state of Maharashtra in India during eight weeks (mid-September to mid-November 2007).

First the choice of qualitative or quantitative study is made on the basis of research question. Econometric evidence of a positive correlation between participation and better project results has already been established (Isham & Kähkönen 2002). I aim to understand the process better, and thus the qualitative path is chosen. When choosing method within qualitative methodology I considered some factors, of which the time limitation (one researcher during 8 weeks in an unknown setting), the language barrier (a translator is needed to speak with the majority of affected people), and the gender aspect (me being a man and half of the affected people being women) are the three most important.

A balance between looking at different performances in different areas and in different villages and still getting deep enough information in each case is needed. A two face approach is therefore chosen. In the first part an overview study of three program areas is carried out. In the second part of the study one program area is chosen for a village level study.

3.2.1 Introduction to the area

An introduction to the work of HCC is given by their project treasurer, Mr. Philip Navdi. Then a three day introduction program in the field with the guidance of the HCC development officer in Phandharpur/Sangola , Mr Viveck Bhaskav, follow. This can be seen as an extended "grand tour question" with a relatively limited amount of semi-structured interviews (Willis 2006, pp. 144-145). On the basis of

[23] Title translated to English reads "Mission in the land of religions".

this introduction program I identify eleven types of stakeholders[24], see table 3.1. Due to time constrains I exclude three of these from the study, the other ones I determine to be more important.

Table 3.1 Stakeholders in drinking water management

	Included in the study	Not included in the study
Area level	- HCC development officer - HCC staff - Staff at block development office	- NGO previously or now working in the area - District level government
Village level	- Village level government - Female users - Male users - Care taker of the hand pump - Community health volunteer	- Former land owner of the land used for the bore well

Source: author's construction

3.2.2 Study at taluka level

Three Talukas (administrative area) are chosen for the overview study; Pandharpur/Sangola, Rampurvardi and Indapur [25]. The choice made mainly due to logistical reasons, i.e. available travel arrangement and availability of present program staff. In each taluka semi-structured interviews are carried out with staff from the NGO along with a field visit in the area. These interviews are mostly carried out directly in English, but in some cases one staff-member interpreted the answers from a fellow staff-member. This material, together with the theory and previous research, forms the foundation for a village level study.

3.2.3 Study at village level

The Phandarpur/Sangola block is chosen for the detailed village level study because of the heavy focus on the drinking water issue in the area and because of the stage of project activities; the drinking water constructions had been in place for some time (1-2 years) but HCC is still working in the villages and thus have easy access to the villages. Eight program villages are included in the study. These are chosen with purposive sampling: villages of different size and variation in environmental conditions are chosen with the help of HCC's development officer in the area. In addition two reference villages where HCC has not been working is also studied. The reference villages are chosen randomly within the same area.

In every program village two to three semi-structured focus group interviews[26] are conducted. Except ordinary users I try to include members of the Gram Panchayat (the village level governing body) and the trained care taker of the hand pump (see table 3.2). Community Health Volunteers (CHV) are covered through attending a separate CHV-meeting where a focus group interview with them is conducted. Two

[24] According to the definition of Mikkelsen (2005, p. 349) stakeholders are "all those who have interest in an intervention or are likely to be affected by it"

[25] A taluka is an administrative area established by the government. However, the field office of HCC in Pandharpur covers both the taluka of Pandharpur and the neighbouring Sangola taluka, and thus I refer to Pandharpur/Sangola as a single taluka in this paper. Talkukas are also referred to as blocks.

[26] A focus group is a research technique where data is collected through group interaction concerning a topic decided by the researcher (Wibeck 2000, p. 23).

approaches to form the focus groups are used. Either I am invited for tea by the Sarpanch (the president of the Gram Panchayat) in the centre of the village and a focus group is created with men present at that time, or we drive to an HCC-installed hand pump, often in a village hamlet, and create a focus group with the people present in the vicinity. With this second approach it normally take about five minutes to create a group spontaneously while the alternative approach often is arranged in advance by the HCC-staff. The focus groups around the hand pumps normally consists of three to six people and the village centre meetings could become somewhat larger, although normally only about three people in each group take initiative to speak. Every session lasts for approximately 30 minutes up to an hour.

Table 3.2 Conducted focus group interviews in Pandharpur/Sangola

Village	Number of focus groups interviews with users	Sarpanch present in any of the interviews	Maintenance person present in any of the interviews
Bohuli	3	Yes	Yes
Diksal	1	-	-
Huatakae Mangewalli (reference village)	1	Yes	-
Itaki (reference village)	1	Yes	-
Khardi (women's group)	1	-	Yes
Mathwest (women's group)	1	-	Yes
Mesingi	2	Yes	-
Narraj	3	Yes	Yes
Umborgum	3	-	Yes
Village V[27]	2	Yes	-
Village W[28] (women's group)	1	-	-
Waki	3	Yes	-
Wuni Chinchale	2	-	-

Source: author's construction

This way of selecting informants creates biases in two ways: Only people living close to the bore wells are included in the focus groups, and the majority of people participating in the focus groups are using a project bore well, even though the majority of bore wells in the villages are government installed. Awareness of this underlay the analysis.

Mainly men are present, but in some groups also women take part. This bias was created due to the fact that we often are five men (me, two men from HCC, and two male interpreters who arrive to conduct the

[27] Because my field notes unfortunately are incomplete regarding the names of all visited villages two villages are named "Village V" and "Village W" in the thesis.

[28] See previous note.

interviews). Thus, a limited complementing study is carried out conducting three focus group interviews with women's saving groups in three villages, accompanied by female staff-members from HCC.

In the reference villages only one focus group is carried out with a larger group of men gathered in the Gram Panchayat office. This makes it difficult to analyze the gender aspect in these villages, this has to be dealt with only through the expressed attitudes of men.

The reasons for choosing focus groups is to address two out of the three major factors (mentioned in the introduction of 3.2) obstructing the possibilities of carrying out this study: With focus groups it is possible to gather more material within the given timeframe. I also believe it is easier to meet a group of women for an interview instead of individual single woman. The third major limitation is the language barrier and the need to use an interpreter hints that focus groups should not be used. Simultaneous interpretation of a free discussion with several informants is complicated. But with structured focus groups with relatively narrow questions I find it possible to moderate a group interview with an interpreter. But this approach has the drawback of the translation often being a summary made after the group discussion had led to some conclusion on each question.

Most of the interviews are interpreted by different college lectures from Sangola College (not related to HCC) but in some cases some HCC-staff interpret[29].

3.3. Analyzing the data

The interviews are recorded and the recordings are partly transcribed. Out of the transcriptions synthesises of the conditions in every village on different topics is constructed (see appendix 2 and 3) and a comparative institutional analysis based on the framework presented in the theory chapter is used to analyze the material.

[29] The quoted statements of people in the thesis are reconstructions based on the interpretations to English, i.e. when the interpreter says "she says she is not much educated" the quotation read "I am not much educated".

4. Background for the empirical study

This background chapter includes an introduction to the federal system of India, the social context and water management in India. The studied NGO is also introduced with focus on its development work.

4.1 Indian federalism and the Indian village

When discussing decentralization and common pool resource management some background of the Indian federal political system is needed, thus follows this presentation.

India, a union of states, is a democratic republic with a parliamentary system of government. Its federal system is extensive with many levels. There are 28 states and 7 Union territories in the country[30], see figure 4.1. The decision-making body of the union is an elected parliament. The President is the constitutional head of Executive of the Union. In the states, the Governor, as the representative of the President, is the head of Executive. The system of government in states closely resembles that of the Union with a state parliament (Government of India 2007a). In the rest of this paper I make no difference between state or union program so when I use the term Government I mean state or union government. When I refer to the local governing bodies I use the concepts developed below.

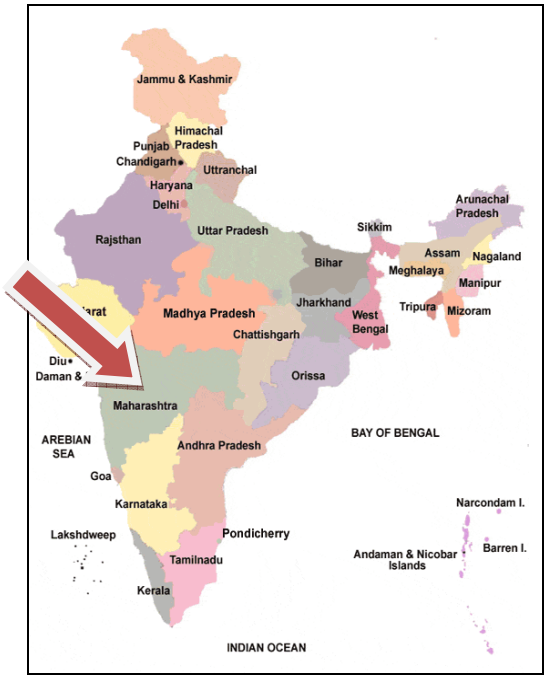

Figure 4.1 States and Union territories of India
Arrow pointing to Maharashtra

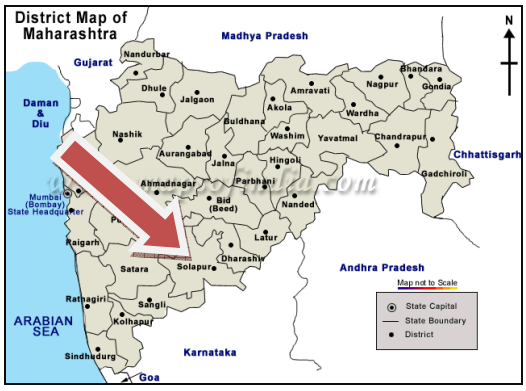

Figure 4.2 Taluks in Maharashtra
Arrow pointing at Solapur

[30] Union Territories are administered by the president through an administrator appointed by him.

Within the states there are a three-tier “federal system” called Panchayati Raj (Tripathy 2006, p. 70). The area which this study focuses lies within Maharashtra state. This state with close to 97 million people according to the 2001 census, is divided into 35 districts, see figure 4.2. The focus area lies within Solapur district with approximately 3.8 million people (Government of India 2007b).

The Solapur district, see figure 4.3, comprises of eleven administrative areas called talukas or blocks. Two of these are the focus of this study: Pandharpur and Sangola. Pandharpur has a population of 402 707 people in 95 villages and Sangola a population of 272 077 people in 103 villages according to the 2001 census (Government of India 2007b).

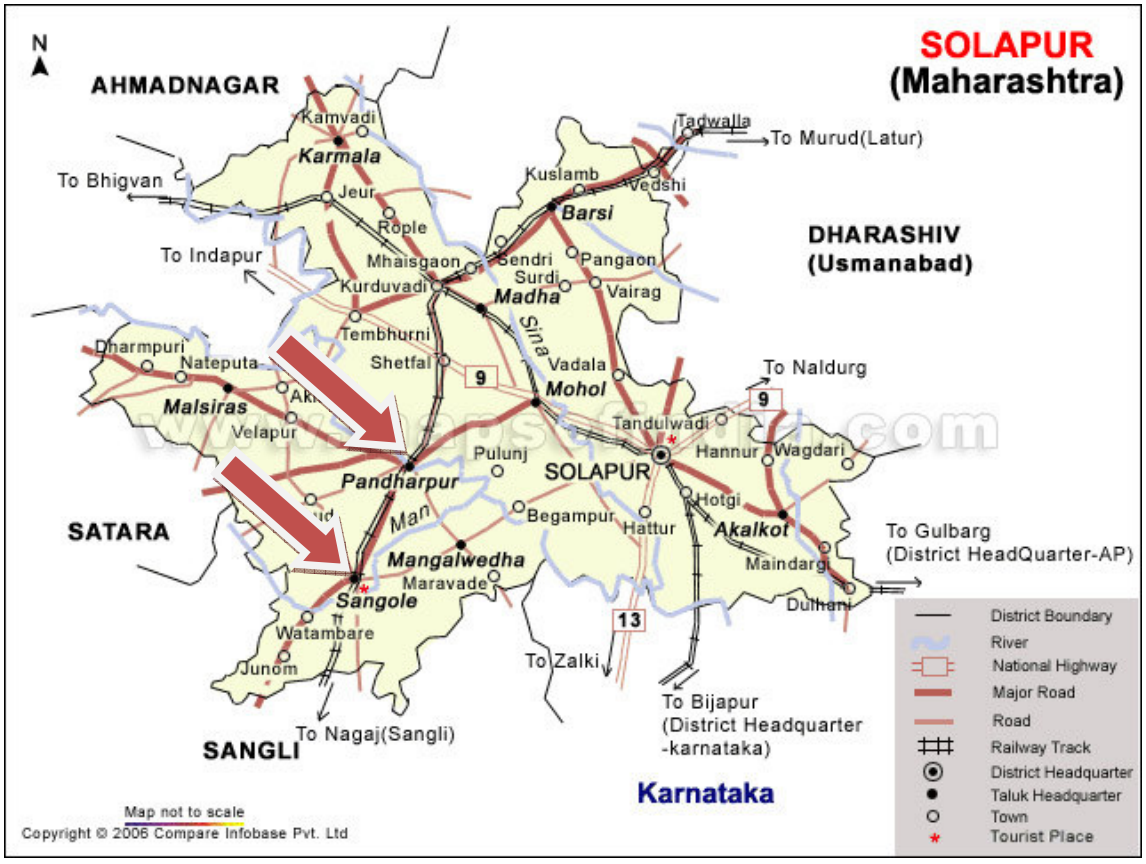

Figure 4.3 Map of Solapur district, arrows pointing at Panharpur and Sangola

At each administrative level there is an elected governing body: at district level called Zilla Parishad, at taluka level called Panchayat Samiti, and at village level called Gram Panchayat (Government of Maharashtra 2007a). At each level there are also civil servants working for the government.

The concept of the Indian village has two meanings. One is the juridical meaning, which includes everyone living in a certain area independently of living in a housing establishment out in the fields or in the village centre. All these people are eligible to vote in the election to the Gram Panchayat and the Gram Panchayat is responsible for facilitating resources from government schemes to all villagers (Keskar 2007). The Gram

Panchayat also has the power to hear complaints from villagers and administer punishment (Sharma 2006, p. 1).

The other notion is the one of the larger gathering of houses that makes up what appears to the observer as the village (observation). When I use the term village in this paper I mean the juridical term, thus all people who will receive the government service through the Gram Panchayat. I use the term "main village" when talking about the other understanding of the village.

There are two more terms I also use to describe the housing pattern. When a group of houses are gathered together outside the main village it is called a hamlet (Bhaskav 2007). A hamlet is a geographical and not political term. The rest of the people live scattered on the fields (observation). So within a village governed by one Gram Panchayat people can live in the main village, in a hamlet or scattered in individual housings on the field.

At the village level there is also a forum called Gram Sabha. It is a village meeting that every villager can attend. Tripathy (2006, p. 72) writes that this function puts elected representatives accountable to the common people directly and regularly. When working properly the forum is entrusted with micro planning, social audit of Gram Panchayat, ratification of Panchayat accounts, identification and approval of beneficiaries and supervisory functions that lowers corruption (Tripathy 2007, p. 71; Mittal 2006, pp. 27-28).

This political structure exists in a social context described next.

4.2 The social context

Both the CIA approach and CPR theory imply an analysis of the context. But of course the whole social system is complex and I therefore choose to present only the three areas I believe to be the most important: religion, caste and gender. The selected focus is based on a literature study of social science writing on India. I believe these to have an important impact on group characteristics (variables G_n) and the institutional setting (variables I_n) introduced in section 2.4.

4.2.1 Religion

Todaro and Smith (2003, p.42) put forward that "[...] religion often play a major role in the success or failure of development efforts". For example a correlation can be found between the diversity of the population and political instability in the country. This means religious diversity could lead to political instability that hinders economic development.

Harris-White (2002) has presented an article on the implications for the economy of the religious pluralism in India. In the article she sees religion as "the institutional arrangements and modes of living to which sacred status have been given by a complex of beliefs and values" and she writes that Hinduism has been very influential in shaping social and legal institutions (ibid. p. 3). Hinduism is the dominating religion in

India (and the studied area), only 17 percent belong to minority religions[31] (ibid., p. 3). The largest minority religion Islam is also influential.

The previous academic discussion on this topic is by Harris-White presented as a polarization between on one hand economist Myrdal's ideas of Hinduism as a reason for India's economic backwardness, and on the other hand Singer's writings on Hinduism as being used for social change (ibid. p. 5). Harris-White herself reaches the conclusion that "the effects are mixed and the influence of religion varies greatly according to context" (ibid. p. 33). But it is evident that religion has not stepped back into the private sphere in India (ibid. p. 6). The state policy of secularism does instead mean equal public respect for all religions (ibid. p. 7). Customary and personal law is organized on religious lines, laws that among other things affect the way inheritance transfer recourses.

4.2.2 The caste system

The Indian society is stratified by caste. The caste system is a part of the Hindu religion but at the same time a separate phenomenon covering the whole Indian society. Because of the dominant position of Hinduism also other religious communities have been included in the caste structure.

The caste system is compiled of two concepts; jati and varna (Narang 2006, pp. 61-63). Jati refers to "interdependent, hierarchically ranked, birth-ascribed groups". Jatis are specific to each region and associated with the traditional occupations in that region. It is the categories of grouped jatis that are called varna and the four varna are the same all over India. The jati group is what counts in the village setting. Jati belonging has traditionally determined once stance against people of other jatis.

How rigid this structure is has been debated; Kaviraj (1997, p.5) writes that caste has shown "a remarkable ability to withstand impact of economic reorganization" but he and other writers such as Mosse (2003) and Srinvas (1976) present data showing that caste over time has been renegotiated due to changes in e.g. land-ownership. The importance of caste in everyday interaction of people is changing and people today do no longer observe the same restrictions, a high caste person is today able to sit next to a low caste person which was not possible before (Srinvas 1976, Bhaskav 2007). Instead caste today has two political and economical roles. It is the base for village politics and it is an indicator of economic stratification. Factionalism is the reality of typical village politics and village politics, is to a large extent based on caste (Sharma 2006, p. 3; Mosse 2003, pp. 132-133). This is because appealing to caste membership is the easiest way to raise a voter constituency in the present reality, when most politicians suggest the same agenda. When it comes to economic stratification lower caste communities are generally poorer than higher caste communities, even tough there are exceptions for individual persons (Sharma 2006, p. 3; Bahskav 2007).

So, Indians segregate themselves on the basis of religion and caste, but a person's sex is also an important determinant as presented next.

[31] Minority religions are Jainism, Buddhism, Sikhism, religions of tribal people, religions of scheduled castes, Christianity, Islam and the Parsi faith (Harris-White 2002. p. 2)

4.2.3 Gender

Sida's position paper on water resources states that "women and men have different needs and control over resources and decision making bodies" (Sida 1999, p. 10). A gender analysis can thus clarify different priorities. In several aspects gender differences are essential in the Indian society.

The life condition of men is generally better than the situation for women. Sen (2005, p. 226) has calculated, based on male-female ratio comparison, that 37 million women were missing in India in 1986. This is, according to Sen, because of a higher mortality rate among females in all age groups. The main reasons for the more severe health situation for women have been repeated pregnancies, child birth, malnutrition, overwork and stress and lack of education (Tripathy 2006, p. 131).

Women and girls work a lot more than men and boys. A study in the Himalayan region found that a pair of bullocks work for 1 064 hours per pair, a man for 1 202 hours and a woman for 3 485 hours in a year on a one hectare farm (Tripathy 2006, p.130). A large part of the women's work is outside what is considered to be the economic sector: she spends time collecting water, fodder and fuel and she takes care of children and cooks food (ibid.).

The political arena has traditionally been open only to men but since 1988 women are guaranteed one third of the seats in decision-making bodies, from the Gram Panchayats to the Parliament (Triparthy 2006, p. 11).

Research has showed that improving the situation of women affect the whole family positively. An educated woman is more likely to participate in the family discussions affecting important issues as health (Tripathy 2006, p. 133). Thus, including women in community affairs is important but needs special attention covering all aspects of women's deprivation. Women will participate when they are enough supported, and if critical mass of participating women is achieved there is greater hope of that this participation also will be sustainable (Kameswari 2006, p. 256).

Now, with basic knowledge about the Indian economical and political system, the caste system, Indian religious reality and gender issues it is time to describe the Indian water situation.

4.3 Water management in India

Water for household consumption has traditionally been provided by open sources, i.e. dams, open wells or directly from rivers (see figure 4.4). It was first in the 1960's, in response to serious draught situations, that investment in rural drinking water systems took off, funded by the Indian state, UNICEF, bilateral donors and different NGO:s (Kolsky et.al. 2000, p. 25). At least one larger private company, Unilever, has financed similar work (Soares 2007). Their motivation, as a private company, is that a stimulated rural economy and increased capacity and knowledge in the rural communities are believed to increase the market of soap and detergents (ibid.).

These investments introduced closed water sources such as bore wells with hand pumps or electrical pumps (see figure 4.5). Electrical pumps can also supply water from open sources trough filter tanks and pipe line connections. The government provides emergency relief with tanker vehicles (Gasavi et.al. 2007).

Ground water is today estimated to be the source of 80-90 percent of drinking water (Kolsky et.al. 2000, p. 8). The national irrigation laws (Indian Easement Act of 1882) state that ground water belongs to the land owner who can freely extract and use it (ibid.) and the state of Maharashtra has not introduced any law restricting the amount to be used (Baliram et.al. 2007). Enforcing such rules by bureaucratic institutions is also thought to be almost impossible (ibid.).

Figure 4.4 Open well

Figure 4.5. Hand pump

In 1970 a major synchronized system change in the drinking water regime was to take place as a result of a national conference at Madurai (Kolsky et.al 2000, p. 39). The conference recommended a three-tier system of hand pump maintenance with a village caretaker, a taluka-level mechanic (for a hundred pumps) and a mobile repair team at district level (for a thousand hand pumps). The structures would still be owned by the central government. The village caretaker was supposed to carry out his duties unpaid; duties include preventive maintenance and report of brake down. Most village care takers quickly stopped performing this work (ibid.). Actually, in practice the system was quickly replaced by a one-tier system with a mobile team carrying out all the maintenance.

The water situation is still a great problem for India. The per capita availability of water in India in 2001 was estimated to be half of the 1947-level (Narain 2006, p. 2). In 2000 one of six inhabitants in rural areas was lacking what the government considers to be acceptable water coverage (Kolsky etl.al. 2000, p. 25). This is both because the ground water table today is declining across the country, and the infrastructure for water provision is deteriorating while population is growing (ibid.).

By the shift of the millennium several evaluations of water programs were published and the latest major shift in policy took place. Several organizations made new efforts to involve the local community. Kolsky et. al. concluded that:

> *"Community-based management of water supply can alleviate the massive government expenditures in operation and maintenance, but much sound pilot work and evaluations remains before this goal can be achieved."*
> (Kolsky et.al. 2000, p. 2)

The Indian government also recognized that sustainability was a problem with its program and that infrastructure was deteriorating (Narain 2006, p. 12). The government now turned to allocate 20 percent of the rural water supply funds to quality improvement of already installed pumps and, and 15 percent for operation and maintenance. In 2002 the program was further altered so that the community would own, operate and maintain the water system (ibid.). This means that the communities are required to contribute with ten percent of the total capital costs and that Gram Panchayats becomes responsible for operation and maintenance of the scheme. The Gram Panchayat charges the villagers and recovers costs for maintaining the scheme. This reformed government program has not yet had any large impact in Maharashtra and is not covered by this study.

4.4 Hindustani Covenant Church

The studied NGO, Hindustani Covenant Church (HCC), is a protestant church with congregations gathering people for Sunday service. It also has a large sector of social work and development work, i.e. they run schools and medical services, their social workers tries to raise aids awareness among tobacco workers in Solapur, they teach kids in the slum areas of Mumbai, and work with the issue of child labor in Pune etc. (Navdi 2007; observation). In addition their disaster support team is always ready to leave for any place in India in just a day or two (Keskar 2007a). Water was the starting point for all this.

The drilling of new bore wells in Maharashtra by HCC and its predecessor[32] has been going on since the 1960's (Fröberg & Jallen 2004, p. 31). They only drill bore wells for household consumption of water. They have always claimed that these deep drilled wells are not suitable for irrigation, at first because the electric pumps needed to extract the irrigation water were too expensive (ibid., p. 32) and today because they have learnt what ecological constrains there are on the ground water level (Bhaskav 2007). However they believe the bore wells are very suitable for hand pumping of drinking water.

Oskar Carlsson, a Swedish engineer and volunteer of the HCC run Solapur Well Service, developed the India Mark II hand pump that became standardized in cooperation with UNICEF (Carlsson 2004). This pump has since been spread around the world through UNICEF (Carlsson 2004; Navdi 2007; Kolsky et.al. 2000, p. 21, 36). A lot of HCC experience of the practices of people has continuously improved the design of the hand pump[33] (Navdi 2007; Carlsson 2004).

Fröberg & Jallen (2004, p. 34), early involved in the activities, states that it was good maintenance practices that was most difficult to establish. The tendency was that when the wells became dysfunctional the people just stopped using them. Over the years the work has steadily gone through a learning process and the practice has also evolved. More focus was to be given to pump service.

According to Singh (2004, pp. 27-28) HCC today has the goal to be able to meet the full need of society, by integrating a variety of activities. The development and social work aims at reaching all people independent of caste, class or religion. Singh say that by the programs people are able to overcome unemployment and poverty and unfair structures in society. One important goal is also to strengthen the position of women.

[32] The work was started by the Mission Covenant Youth of Sweden (SMU).
[33] For example they learnt that children play with the hand pump by covering the tap with their hands while pumping, this damage the pump. They solved this by putting holes in the tap pipe allowing water to exit an alternative way when the pump is put into such practice.

HCC´s water policy states that it wishes to "promote an understanding which will preserve and support initiative that will [make] water accessible to all" (Hindustani Covenant Church 2004, p. 2). The main principles for the projects are; active grass root involvement, strengthen peoples own agency, evoke social awareness (awareness of human rights, social rights, equality and the importance of sustainable natural resource management), organizing cooperations and a focus on poverty reduction (Singh 2004, pp. 29-30).

In summary, India has established a federal system which includes a village level governing body. Sociological variables such as religion, the caste system and gender differences are likely to affect institutional arrangements around water. Centralized water management has been the norm in India but now there is a trend towards decentralized management. This chapter also introduced the studied NGO, Hindustani Covenant Church.

5. Introducing a new system, a presentation of the project cycle

In this chapter I will begin to present the empirical data extracted through the field study. The outline of this chapter follows the project cycle: project design, implementation, and operation and maintenance (according to Montogomery 1989, p. 90). Thus the empirical findings on two model variables: the direct actions on the active external agency (A_o) and the participation of villagers (P_o), are given. These two variables must be presented in tandem because they to a large extent can be substitutes.

The block development officer (BDO) has, as a representative of the Maharashtra government, the responsibility for implementing the government hand pump scheme in all villages of the taluka (Gasavi et.al. 2007). In Pandharpur this means responsibility for maintenance of 1 471 hand pumps in 94 villages. For this, four people are employed at taluka level. They also have a budget which allows for 10-15 subsidized new hand pumps to be installed each year.

HCC was in 2004, after three years of severe draught in the region, invited by the government to start working with the water issue in the two talukas of Pandharpur and Sangola. The government provided office facilities in the government campus in Pandharpur, where HCC set up their joint field office for both talukas with eight employees (Bhaskav et.al. 2007). A dialogue with government representatives decided which villages HCC should start working in (Bhaskav 2007). The work was started in 15 villages in Pandharpur and 15 in Sangola (ibid.).

The comparative approach of this study implies that under each heading I first describe the government program and then describe HCC's program. Since the HCC program introduces community management the practices in each village differs more within the HCC program than within the centralized practices of the government (the government shift towards community management has not yet had any larger impact in this region). Thus more space in the following presentation is given to the HCC program.

5.1 Project design

Project design in the government scheme has gone through two stages according to government staff: (1) selection of villages and (2) selection of placement of the well (Gasvi et.al. 2007). According to HCC staff their program has four stages of project design: (1) selection of villages, (2) participatory rural appraisal (PRA), (3) selection of communities, (4) decisions on exact location. They emphasize that their approach is holistic and they see their introduction to the village as a rather long process (Bharskav 2007, Navdi 2007, Keskar 2007). The process from introduction to installation takes about six months (Bhaskav 2007). The issue of selecting villages is not included in this paper but the other steps are now presented.

5.1.1 Learning more about the village

After the decision to approach a village HCC organizes a Gram Sabha, were they present what they want to do in the village. If the villagers want to proceed, the initial meeting is soon followed by five days of meetings were HCC staff together with villagers conduct "participatory rural appraisal" (PRA). This is a process where the villagers together with the organization learn more about the village (Bhaskav 2007). During PRA HCC gathers a group of 20-30 people to share their knowledge about the village (ibid.). These

groups include both young and old people. The thirteen PRA-tools that HCC use include: area mappings of resources, social mappings of caste and religion, flow charts of income and expenditure, problem analysis in form of causal diagrams etc., see figure 5.1 for an illustration (HCC 2004). This process often involves heavy discussion and disagreement among the participants (on issues such as on which side of the road a well is located) before they reach an agreement (Bhaskav 2007). Participants also tell how they learnt new things about their own village while participating in the PRA process. HCC supplements PRA by conducting village corner meetings where all people can participate in smaller groups of people discussing their situation. HCC introduced this method in 2004 (HCC 2004) and according to Navdi (2007) the aim is to make the villagers themselves able to do the next PRA session for continues work after the ongoing program has been implemented.

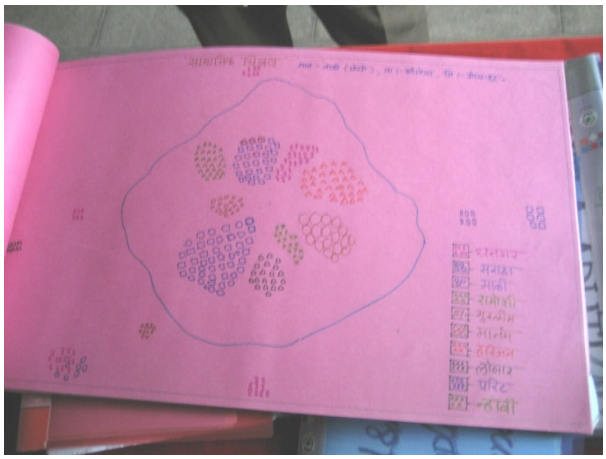

Figure 5.1 One PRA document illustrating living patterns of caste communities within a village

The gathered data for this study does not allow for any presentation of different outcomes of PRA in different villages or a presentation of who the stakeholders that influence this process most are.

The government has a more technology based approach and do not do a PRA of the village (Gasavi et.al. 2007).

5.1.2 Decision to install a well

After HCC has conducted its introduction program in the village it is the villagers' decision to apply for participation in the bore well program (Bhaskav 2007). A group within the village can apply through the Gram Panchayat to HCC (ibid.). HCC's budget, together with the size of the village, decides how many bore wells the organization is prepared to install in the village and how many hand pumps they are willing to repair (Navdi 2007). When the village applications have reached the NGO they once again call the Gram Sabha where it is decided which communities within the village that should get the installations (Bhaskav 2007). The criterion from the NGO is that it should benefit the neediest people. With the help of mappings created through the PRA they facilitate a discussion where the NGO and the meeting reach a conclusion of which areas to target.

Three explanations of how the initiatives to join the program are given (for details see appendix 2). Most of the interviewed people said that all people came together and requested a pump after HCC had "created awareness" among them. In one community in Wuni Chinchale and one in Medshingi they specify that it was the women who took initiative. In Wuni Chinchale it was an accident that led women to take the initiative for a new pump. One woman had drowned when she accidently fell into the open well which triggered the community to search for alternatives.

It happens, due to political conflicts, that the Gram Panchayat deny to forward the request and some people go directly to HCC to explain their interest. HCC will not start the work if it is not supported by the Gram Panchayat but they can help the group in the discussion with the Gram Panchayat. Bhaskav (2007) mention one such incident and at that occasion a little persuasion conducted by him was needed to get the Sarpanch to agree to the work being done.

5.1.3 Decision on placement

The decision on where in the village the government pumps will be installed has in the visited villages been taken by civil servants together with the Gram Panchayat. No Gram Sabha was involved. This was for example explained in Huatakae Mangewalli:

> *Q: "How was it decided where to place the hand pumps?"*
> *A: "Gram Panchayat and government decided. Government officials came to the village and said they would put three hand pumps here."*
> *(Huatakae Mangewalli villagers 2007)*

When I asked more about this they also clarified that there was no Gram Sabha arranged to discuss the issue.

The new reformed version of the government program, implemented 2007, leave the decision for the Gram Sabha. However, this version of the government program had not been implemented in any of the studied villages at the time of this study. HCC's approach thus differs. When HCC has accepted the application for a new pump a meeting is held in the area with the potential users of the hand pump. They are asked to decide exactly where to install the hand pump. Villagers are provided with groundwater surveys with information on where water can be found to base their decision on. It is a requirement from HCC that they agree to actively contribute ten per cent of the installation cost. This is mostly provided in-kind, i.e. stones and labour.

Because of the big differences in availability of ground water (the situation can be completely different from one location to another even if they are only hundred meters apart) the hydrological surveys play the major role in the decision of location. This process is presented with statements like:

> *"This position is the main [central] point decided by all members. This place is governments land so [there was] no objection. Of course this place is chosen for the survey of water."*
> *(Umborgum pump users 2007a)*

"They carried out geological survey and decided that this is the proper place for hand pump."
(Village V pump users 2007b)

Only one case of disagreement was mentioned, people in Medshingi explained:

"[There] was a discussion. The people living there demanded that it should be there and not here. But when we all come together we decided this is a proper place, center to all. The opposition [consisting of 10-30 percent] is not happy. But now it's ok."
(Medshingi pump users 2007b)

The people giving the last statement also explained that the issue was decided in a discussion and that no voting took place during the meeting.

5.2 Implementation

When the village and location is decided it is time to install the bore well with hand pump. At the time of installation of the government pumps in the studied villages the locals did not contribute, neither money or in-kind, but they afterwards pay taxes for using the pump (Itaki villagers 2007: Huatakae Mangewalli villagers 2007). The government pump was installed by government employees.

In the HCC program it has been arranged differently. There is a fixed sum of ten percent of the installation cost which the community has to contribute (Bhaskav 2007). This is mostly paid in-kind. A Gram Sabha is called where the villagers themselves decide the form of contribution for each and every family. Some will provide stones, others will provide labour etc. The process comes natural according to the villagers; if someone has a tractor he will supply that (Village V pump users 2007a). The contribution must be physically shown before HCC add their part. The process is supervised jointly by village leaders and HCC but HCC does not interfere in the decision of who will provide what as explained by Bhaskav (2007):

Q: "Is there a difference within the community what people can afford?"
A: "Yes"
Q: "How do you accommodate that?"
A: "No, we do not do that. [We do not say] you pay that much, you pay that much. We are not involved in this process. They solve these things."
(Bhaskav 2007)

HCC also makes it easier for the villagers to participate by thinking about the seasonal differences of the rural community:

Q: "Is it easy to get the people to take the time to attend?"
A: "But we conduct the training program and those types of activities in that period when they don't have work. You can say, in rainy season, if there is regular rain that time they don't have work in their field. Because if they have work in their field and we call them it may be some problem for them. So according to their time circle and according to their requirements."
(Bhaskav 2007)

5.3 Operation and Maintenance

The hand pumps installed by the government are the property of the state government and the maintenance is the responsibility of the taluka level officials (Gasavi et.al. 2007), as the all India system described in chapter four. To cover the expenses for maintenance the government collect an annual water tax from the villages. In the village Gram Panchayat is responsible to report a brake down of the government pump to the BDO in the taluka (ibid.). When brake down is reported the BDO sends a mobile repair team to the village. According to the government staff in Pandharpur it takes up to two days for them to repair a pump (ibid.).

The experience of the time for a BDO to repair it various greatly among villages. People in Diksal, Bohuli and Wuni Chinchale all agree it is a long process and Diksal specify it to two to three months. A completely different answer is given from Medsingi who says it takes only two days. The situation in the rest of the villages was not clarified. Talking to HCC staff and Municipal staff it is obvious that even this is a political question and politicians are involved in determining priorities (Bhaskav 2007, Gasavi et. al. 2007). Village with good connections with the government can thus have a much more positive experience of government support. The physical distance from the village to block office also matters.

After the construction of pumps by HCC the idea is that a user group with all users should make a decision about maintenance of the hand pump. The hand pump becomes the property of the local community. One or more persons in every village, selected by the villagers, are also trained to do the maintenance of the hand pump. How many that are trained is decided by HCC based on village size (Bhaskav 2007). In Pandharpur there are 29 persons trained and in Sangola there are 34, out of these 30 are men and 33 are women (ibid.). The stated aim of HCC is to mainly train women (Sheikar Singh 2007). There are three categories of people trained; Community health volunteers, Gram Panchayat employees called pions, and other volunteers who are called civilians in table 5.1 (see appendix 2).How the villagers select their caretaker is somewhat unclear but in general people seem to have the opinion that a suitable person got the training. The information of who would be a good candidate to train seems to be given more informally to the NGO through PRA and discussions with users, it is not a formal decision in a meeting (Bhaskav 2007).

People explain the reasons of choosing the person with the following:

- *"He normally takes initiative" (Narraj)*
- *"He is interested in this field" (Waki)*
- *"He had the capacity" (Waki)*
- *"A proper person" (Diksal)*
- *"He was most keen to get the training" (Wuni Chinchale)*

In some cases the person get paid to carry out the work and in some villages the person does it completely for free. The caretaker in Umborgum explains why he is doing it for free:

> *"I am poor, they are also poor. I can help people who are like me. This is a great satisfaction for me. [...] When I attended [Gram Panchayat] meeting they talked about paying money because I take care of all the pumps but I said no, I don't need because it is satisfaction for me that I'm doing some social work. This is enough for me. "*
> *(Umborgum caretaker 2007)*

The way people participate in maintenance in the villages were HCC has worked is presented in table 5.1 and explained below.

Table 5.1 Maintenance practices

	Narraj	Waki	Village V	Diksal	Wuni Chinchale	Medshingi	Umbor-gum	Bohuli
Respons-ible to organize main-tenance	Maintenance person	Gram Panchayat and maintenance person	Gram Panchayat and maintenance person	Gram Panchayat	Gram Panchayat and informal leader	Gram Panchayat	Gram Panchayat and informal leader	Informal leader
Level of funding	User group	Village	Village	User group	User group	User group[34]	User group	User group
Who contribute	Ten families	-	-	All bene-ficiaries	All bene-ficiaries	All bene-ficiaries	All bene-ficiaries	All bene-ficiaries
People trained	One	One	One	One	One	One	Several	Several
Who is trained	Civilian	Civilian	Pion	Civilian	Civilian	Unkown	CHV, Pions, Civilians	Pions and Civilians
Payment for care taker	No	Yes	Yes	Unknown	Unknown	Unknown	Yes	Yes
Local main-tenance of all pumps	No	Yes	No	Yes	Yes	No	Yes	Yes

Source: see appendix 2

How the local community organize the utilization of this capacity (trained person with tools) is perhaps what differs most among villages. Some villages take care of all maintenance of all village pumps with this new capacity, including government provided pumps (see table 5.1).

In some cases the maintenance person is also responsible for organizing the meetings where the decisions about maintenance are taken. In other villages Gram Panchayat organizes these meetings and in yet other villages there is a separate volunteer in each user group responsible for organizing meetings (see table 5.1).

In two villages all funding for maintenance is taken from a village level common pool funded by taxes. In most villages the funding is organized locally around one hand pump with the specific beneficiaries covering the costs of maintenance of their specific pump (see table 5.1). In Wuni Chinchale and Umborgum the answer to the question of who organizes maintenance is that both the Gram Panchayat and a volunteer organize maintenance. I find it to reveal the fact that if Gram Panchayat organizes maintenance of the hand pump in the main village the situation can be different in the hamlets outside the main village.

Also the formalization of user groups differs. HCC staff (Bhaskav 2007, Navdi 2007, Singh 2007) talk about user groups as something existing for all hand pumps but even the villages that organize maintenance at

[34] Except for costly parts provided by the Gram Panchayat.

pump level do not have any formal organization for the specific pump. There is no elected committee for the user group and no elected president. If a formal organization with an elected committee and chairmen is present it is a committee at village level (see appendix 2).

Another vulnerability with low number of people trained is exemplified by the experience from Wuni Chinchale were they have a system of local maintenance of all pumps. Here there is only one person trained. The trained person is a 22-year old male with ambitions, at several occasions away from the village. The persons interviewed reported their experience that it once took ten days to repair a broken hand pump because he was not directly available. So even if the village only has 15 hand pumps the maintenance capacity of having only one person trained makes it vulnerable.

5.4. Sustainability of the program

This section presents the result of the HCC program. Statistics about hand pump provision in the visited villages are first presented in table. 5.2.

Table 5.2 Population and pumps

Village	Population	Nr. Of government pump	Nr. of HCC-installed pumps	Individuals per pump - before HCC program	Individuals per pump - after HCC program
Narraj	1300	3	4	433	185
Waki	3000	6	5	500	272
Village V	4100	30	6	136	113
Diksal	Unknown	12	3	Unknown	Unknown
Wuni Chinchale	Unknown	12	Unknown	Unknown	Unknown
Medshingi	7000	40	6	175	152
Umborgum	2500	19	2	131	119
Bohuli	Unknown	20	4	Unknown	Unknown
Reference villages not assisted by HCC:					
Itaki	786	7	0	112	-
Hutakae Mangewalli	1600	6	0	266	-

Source: All numbers in the table are given by village informants and HCC staff.

As stated in the aim of the study I investigate two dependent variables as indicators of sustainable drinking water management, one: user satisfaction with the functioning of the bore well and two: existence of institution for maintenance of the bore well.

In every HCC program village beneficiaries express a clear satisfaction with the working conditions of their new hand pump (see appendix 1). The dissatisfaction, when mentioned, is with the number of available bore wells and/or the situation in the summer season. Examples of statements are:

"We are satisfied with the installation. […] The problem is in summer season, at that time we must carry water."
(Diksal pump user 2007a)

"All the bore wells are in good condition. All having good water. Not a single bore failed here."
(Waki pump users 2007a)

"It's good water. Sufficient for all, all year around. [But] 46 bore wells are not sufficient for this area. The need [for more wells] is outside the main village in remote areas. 7-8 pumps more is demanded."
(Medshingi pump users 2007a)

The last statement should be understood as they have enough water in the well they are using but the number of wells in place is not sufficient to meet the demands of the village.

All HCC pumps that had enough water were properly functioning (see appendix 2). The villagers reported that all those that had malfunctioned had been properly maintained within 10 days. Several of the visited communities had not yet been in need to try its maintenance institution.

5.5 More development work in the same villages

Drinking water is often the number one priority among the villagers but HCC's holistic approach to village development also includes other areas. The same development workers from HCC continue to work in the villages on other needs of the people (Bhaskav et. al. 2007). In the ongoing program they plan to stay for at the most six years in the same village. The work being done is, according to Bhaskav (2007); Navdi (2007); Keskar (2007), related to:

- **Sanitation:** as building latrines and educating people on health issues.
- **Water harvesting:** building water harvesting structures.
- **Farming:** as educating farmers about composting and using the right amount of water for each crop.
- **Forming different community groups**: farmers' groups, women's groups and youth groups.
- **Small businesses**: Helping women starting goat rearing, candle making etc.

HCC uses the same approach on every issue they work on. They demand an active participation and contribution from the villagers and only subsidize constructions, they never provide anything but education and advice for free (ibid.).

One teacher in Diksal explains that their village has changed:

"Nowadays people have come very aware of their social responsibility. They cooperate now so that attitude has changed. The change was because of the hand pumps, because they are now contributing. Before the attitude were myself. "
(Diksal pump users 2007)

HCC plans to work in each village only for a limited period of time and then be able to leave. HCC's regional managers state this clearly but the field staff and villagers have hesitations about that HCC will really leave the village at the end of the given timeframe. But some villages carry on with the development of the village by their own before HCC is scheduled to leave. For example Waki has joined a Maharasthra government program to establish a conflict free village (Waki pump users 2007) and Diksal has constructed a new road in their village by contributing 10% in a government program (Diksal pump users 2007).

In summery, management regimes can differ on all stages of the project cycle. Also other characteristics differs among the studied villages, these characteristics are presented in the following chapter.

6. Village characteristics

The analytical framework presented in chapter two (see section 2.3.2) specifies group characteristics, institutional characteristics and the external environment as important to understand how well participation works to achieve sustainability. This chapter presents the findings on these issues in the studied villages.

The comparative method used in this study implies that under each heading I first describe the village characteristics before HCC started their work and then describe if and how HCC has affected this. This chapter follows Agrawal's research summery introduced in chapter two and presented in more detail in appendix 1.

6.1 Group characteristics

Agrawal (2004) identifies a number of characteristics that affect the possibility to set up sustainable local management institutions; group size, clarity of group boundaries, social capital, appropriate leadership, interdependence among group members, homogeneity of identities and interest, and level of poverty. . In addition I would like to add human capital since local people themselves refer to their limited knowledge as a problem for village development.

6.1.1 Group size and boundaries

Many people in this region live scattered in small hamlets and in single family settlements on the field (observation). For example in Medshingi, with a total population of 7000, 2000 people live outside the main village and in Umborgum with a total population of 2500, 1500 live outside the main village (Medshingi pump users 2007; Umborgum pump users 2007).The users of one hand pump are normally a group of 100-300 people when it is placed outside the main village (see appendix 2). In the main village the group of users would add up to 500 people.

The initial group of people contributing to the construction of a new bore well with the help of HCC will be requested to be at least ten families (Bhaskav 2007). This means that HCC will start their work, even though many people in the area will have hesitations about contributing, if the group taking initiative is large enough, and this is often the case (Bhaskav 2007). I was told that when people not participating in the construction phase end up using the hand pump, and experience the maintenance process working, more and more people join the group of people participating in maintenance. This is expressed in Village V:

> *"There is no rule hindering the people who have not contributed to use the pump. Say that some people are so poor that we can't take money from that people. The one who didn't contribute at first [later] say now we are ready to contribute."*
> *(Village V pump users 2007b)*

Thus, the group of people participating in construction and the group that participate in maintenance are of different sizes and even more people will utilize the pump. The large number of people in the villages that migrate seasonally as sugar cane cutters also effect group numbers and group boundaries.

6.1.2 Social capital

When it comes to social capital one can analytically differentiate between structural social capital and cognitive social capital (Mikkelsen 2005, p. 248-249). Structural social capital means "relatively external and externally observable social structures, such as networks and associations [...], and the rules and procedure they embody" (ibid, 248). Cognitive social capital means the more "subjective and intangible elements such as generally accepted attitudes and norms of behaviour, shared values, reciprocity and trust" (ibid). This study allows for a discussion of structural social capital but my attempts to be able to clarify to what extent the villagers share norms etc. has been limited. This due to that the line of questioning that could reveal these intangible elements is much more time consuming and the language barrier makes this abstract line of discussion with informants difficult.

The issue of initial structural social capital in the villages is an issue of limited social capital. The only formal village organization is the elected body of the Gram Panchayat and its potential committees. Committees can take responsibility for the village development in different areas. For example in Narraj they have water-, health-, education-, cleaning- and health care committees (Narraj pump user 2007c).

In villages where no government agency or NGO have recently worked the Gram Panchayat meets as seldom as two times a year and has no Gram Sabha (Hutakae Mangewalli villagers 2007; Itaki villagers 2007). In villages with more contact with government schemes or NGO:s the elected body is more active and gather the whole village to discuss common issues at Gram Sabha.

People indicate that it is the many religious festivals that make people come together (see appendix 2). Before the festivals they also work together to organize the events. For example in one visited village loud speakers announced that it was time to pick up some sugar from the Gram Panchayat office to prepare candy for the up-coming festival (observation). Also weddings are occasions when the villagers come together. People explain that Muslims and Hindus in the villages often join the celebrations of each other's religious festivals. They put this in contrast to religious relations in cities where such interactions do not take place.

When people are asked about common locally owned property they often say that they have none. When this question was asked again with a specific reference to the temple, which was observable in the village they replied that of course that was such a locally owned common property. People collectively gather funds for the temple.

Adopting a gender perspective to social capital gives special insight. When walking through a village not involved with NGO:s one can, for example see men gather to play cards together (observation in Huatakae Mangewalli 2007-10-23). When talking to women they unanimously state that there was no contact between women of different households before HCC initiated it (Village W women's group2007, Khardi 2007; Mathwest 2007). When I asked the women in a women's group in Village W if the group of women meet before the women's group was started by HCC the following answer was given by the interpreter summarizing the women's discussion:

> *"Before we couldn't talk to each other. [Now] we started to discuss in-between us, and now we collect money and take good decisions just like goat rearing. Before we could not come together*

and take decisions. Before no decision on family problems[35]."
(Village W women´s group 2007)

The interviewed women also express that the previous isolation made them not participating in village meetings (ibid.). Bhaskav's experience is somewhat different and his opinion is that women also previously were the most active in religious festivals arrangements (Bhaskav 2007). In some villages the Gram Panchayat has supported the starting of two or three women's groups on the initiative of the government, but the actual activity rate of these groups has been very low (Itaki villagers 2007).

In the main village people live in distinct caste communities while in hamlets people of different castes live mixed (Bhaskav 2007). In the caste mixed areas people of different castes work together to resolve the water issue. Especially this is true for women who meet in caste mixed groups.

HCC introduces a complete program that will affect social capital in the village. Women's groups, youth groups and farmer's groups are started where people are brought together and discuss and try to solve common problems or individual problems where one needs assistance.

6.1.3 Human capital

Human capital is not listed by Agrawal, but people themselves often referred to the importance of "guidance" or new knowledge. The official statistics says that the male literacy rate in the district is 82.0 percent and the female literacy rate is 59.8 percent. People themselves often say that they have only five or six years of schooling. When asked about their views about the future with the villagers from "Village V" said:

"Education is the difference that will make us maintain the hand pump in the future. "
(Village V pump users 2007)

They also say:

"The awareness of not to damage the pump is there."
(Village V pump users 2007)

In the reference village of Huatakae Mangewalli the only government scheme known to the people is that of the work guarantee scheme even though the Maharashtra government has several rural development schemes running, including that of hand pump provision (Huatakae Mangewalli villagers 2007). And even the knowledge about the known scheme is limited. According to the schemes all villagers are supposed to be involved, through Gram Sabha, in the decisions of what work is to be carried out in the program. This is not known to the villagers who participate in the program but state that there are no opportunities available to them for the development of their village. There is never any Gram Sabha arranged in the village and the government information to the village never passes from the Gram Panchayat to the rest of the village. The Gram Panchayat only consists of three people that meet twice a year.

[35] Women in all three visited women's saving groups state that one function of the group is to help solve family problems of its group members. For example in Village W they reported that one of the group members had not been accepted by her in-laws and this became a case handled by the group (Village W 2007).

6.1.4 Leadership

The only mentioned leadership in the non-project villages is that of the Gram Panchayat (Hutakae Mangewalli villagers 2007; Itaki villagers 2007). There are two main ways people from outside the village explain the workings of village elections (Bhaskav 2007, Patil 2007, Keskar & Wagh 2007). One is that people vote on the base of caste, the other is that people vote for the one spending most money on the election campaign.

> *"[...] they will see oh now the person, richer person who spend more gets elected very easily. What he told doesn't matter. [...] What work I have done doesn't matter. "*
> (Keskar & Wagh 2007)

But there are some reservations:

> *"Now there are reservations for backwards[36], and other classes, a richer person can't get that. Then a proper person can get elected."*
> (Keskar & Wagh 2007)

This issue has not been thoroughly discussed with the villagers but the woman Sarpanch in Narraj explained her own success by:

> *"I'm not much educated. I just went to school to the fifth standard. But because of my experience, because of my knowledge, people appreciate and support me. "*
> (Narraj pump users 2007c)

Political leaders are very keen on facilitating resources to their own constituency and in some cases actively working against that resources are made available to people from the political opposition (Bhaskav 2007). Even though the issue of corruption was not discussed with the villagers directly, the broad picture from other informants is that corruption has a solid place in politics in the region (Sharad 2007, Bhaskav 2007, Baliram et.al. 2007). Bhaskav (2007) explains it as that there is a common understanding that it is understandable if the elected person channel a little bit of extra money into his own hand because he spends so much on his election campaign.

In the villages where HCC has been working, leadership of two kinds appears leading water management. The elected leadership of the Gram Panchayat, working as explained above, and the leadership of socially responsible people in the village who takes initiatives that people follow voluntarily. I use the villagers' expressions of "Gram Panchayat-members" and "leaders" to differentiate the two.

There are also existing elected leaders of different groups in the village, such as presidents of women's- and farmers groups present in the village. When asked about whom they elect for leader of non-political groups, such as the women's group, the answers are similar to that of the women in Khardi:

[36] The backwards are the ones considered the lowest rang in the caste hierarchy, actually viewed as not belonging to a caste, these are also called Hijans or Dalits.

"[…] good life, good personality and good knowledge."
(Khardi womens group 2007)

The leader can be presented as:

"He´s just a common man, educated to the fifth standard. But he knows about the problems of this region."
(Narraj pump users 2007a)

One group of people that becomes important for the development of the village is the "Community health volunteer" (CHV). The CHV was introduced by a World Bank program but is today supported by HCC (Bhaskav 2007). These people are generally female teachers (Bhaskav 2007). Their responsibilities were at first to track the village development on health issues by doing household surveys (ibid.). Today the CHV themselves explain their role in general as "rural development through participation and education"[37] (Indapur CHV 2007). The CHVs' explain how they are active in Gram Sabha and ask questions that force Gram Panchayat members to explain their decisions in a way that has not been happening before, for example they are aware of national laws demanding a certain percentage of Gram Panchayat resources to be targeting to women's development and check that this is implemented (ibid.). HCC gives special training for them regularly (Survanshi 2007).

6.1.5 Other group characteristics

The other group characteristics put forward by CPR theory are: Interdependence among group members and levels of poverty. Interdependence of group members is found low. The basic unit is the family which works together to provide what is needed for its members, interaction in-between families has not been mentioned as being part of the solution to any of the basic needs of people. When asking people in villages not involved in any developing program about what is needed for the development of their village the answers given were only answers of individual improvements of people or families (i.e. solution to problems of unemployment) and nothing about issues of collective nature were mentioned (Hutakae Mangewalli villagers 2007; Itaki villagers 2007). The one thing that I have been able to identify that was previously addressed by collective action is transport of the harvest to the market (Keskar 2007).

The region experiences high levels of poverty. These people live in clay huts with straw roofs and their only belongings are clothes and cutlery (observation). But also richer people that live in brick houses, owning items such as a motorcycle and a TV with satellite dish could also be facing drinking water problems, getting their drinking water from an open well (observation; Village W women's group 2007).

[37] The CHV themselves give the following examples of their role: health guides, giving drinking water, creating gender awareness, confidence building in women, teach how to behave in public places, teach how to take care of public property, teaching self help groups, working for liquor ban, organising legal education camp and waste water management etc.

6.2 Relationship between resource system and group characteristics

Agrawal (2001) explains how the group must be matched to the resource to allow for sustainability, for example if the group's dependence on the resource is high the probability that it will be well maintained is higher. Regarding the dependence on a specific hand pump there is a difference between people living in the main village and people living outside. In the main village there are always several pumps and if one has a problem the people can often easily choose to use another. For the people living outside the village their nearest hand pump is often the only available water source except for open wells with lower quality of water, and thus a strong dependence of the specific hand pump is in place.

When people in Narraj discussed the maintenance issue they refer to their strong dependence of the pump to explain what happens when their pump brakes down:

> *"The meeting is called as soon as possible because there are no other source here. We can solve it in one or two days. When it is not working we really haven´t got any source, we come together because we don't have any other option."*
> (Narraj pump users 2007a)

This general relationship is not altered by the HCC program since they mainly install bore wells in places where people, due to the long distance to existing wells, have been restricted to use only open wells.

All people share a belief that "water is life". People not involved with a HCC program translate this to that it therefore should be provided by the government. Maintenance of common property is thus the responsibility of the government.

6.3 Institutional arrangements

Regarding institutional arrangements Agrawal (2001) point towards rules and how they are enforced. Sustainable local management of resources follows, according to theory, of: (1) easily understood rules, (2) that are developed locally, (3) where sanctions for rule braking comes graduate, (4) adjudication is availability at low cost, (5) and there exists accountability of the monitors.

The rules I have identified are of three kinds: rules about how to properly use the pump mechanism, rules restricting the amount of water to use and rules about contributing to the funding. In the non-project villages no rules of the two first kinds exists:

> *Q: " Do they have any special rules about how to use the hand pump?"*
> *A: "No"*
> (Itaki villagers 2007)

The funding is in the government water regime covered by a head tax per family were everyone pays the same amount independent of income or water usage (Gasavi et. al. 2007).

In almost all the project villages only the first type of rule was active. These rules were taught by HCC at a training session by each new or repaired hand pump. The rules include such things as keep the pump area

clean, do not wash clothes near the pump, and use the handle carefully so it does not get broken. Many express that there is no need of putting such simple rules in writing; there are more of a common sense type:

> *"We are the ones who will not get water here if anyone do some damage with this one. It's not rules on paper. There is general contact between people here so we have general rules. We are having good knowledge about that one."*
> (Narraj pump users 2007a)

The same people also say the following about the rules:

> *"It is a heritage, it's a culture, it´s a tradition that we have these rules. So we accept we should not make dirt here […]."*
> (Narraj pump users 2007a)

Villagers also explain that all rules about the proper way to use the pump are taught to them by HCC and villagers themselves have not participated in altering them locally. Informants explain:

> *"The people from your organization came here and taught that […] and there should not be any dirt here. And of course awareness is spread here."*
> (Wuni Chinchale pump user 2007a)

> *"There is a common understanding that we are taking care of this one and we should use properly. The awareness of these rules started since the HCC put the pumps here and it spread and people are now aware. Before that there was nothing in place."*
> (Medshingi pump users 2007a)

In one village I found rules restricting the amount of water to be used. Users around one well had agreed among themselves that the water from the bore well could only be used for human drinking and the watering of animals must thus be solved by other means to save water during summer months (Medshingi pump users 2007b).

In general there seems to be little conflict over utilization and the statements are in line with this statement from Narraj:

> *"There is no conflict there. Ok, sometimes it´s conflict, I take first and then you take. They are solved by group discussion with the elected members of the Gram Panchayat, they discuss with them, all the conflict. They are not serious conflicts."*
> (Narraj pump users 2007a)

There are no rules about having to contribute to installation or maintenance to use the wells. People explain:

"They are ten [families] and they collected per [family] 350 rupees. They shared this equally. [But] all people get water. [We] don't put any restriction of those who do not share money."
(Narraj pump users 2007a)

People contributing say that they believe the ones not contributing will do so in the future or have reasons for not contributing, as being very poor.

The enforcement of existing rules in the project villages are explained in two ways in the five villages where the issue has been clarified[38]. The first approach is that it is the responsibility of the Gram Panchayat (or committee) members (the situation in Narraj, Waki, Medsingi, and Village V). The normal approach is then that one of the Gram Panchayat members first approaches the person in question and instructs him to change his behaviour. If this is not followed a Gram Panchayat meeting can fine the person. The other alternative is that there is a certain person, not elected in any formal way, that has taken as his duty to enforce the rules by watching and when misbehaviour is found his reply is to instruct his fellow community members on correct behaviour (Bohuli pump users 2007). The jurisdiction of the person picking up this responsibility seems to be recognized by people in the community.

6.4 Relationship between resource system and institutional arrangements

The CPR theorists suggest that rules restricting use to match the resource are important. Restrictions on harvesting water in the summer have been found put in place in only one studied village. Not all wells dry up in summer so the need for this is not universal. The need is also eased when complementing structures for the bore well are installed, such as roof water harvesting connected to the bore well (Bhaskav 2007; Baliram et.al. 2007).

6.5 External environment

Under the heading of external environment Agrawals (2001) identifies the technology being used, the community's relations with the external market and its relation with the state.

6.5.1 The technology for exclusion

Agrawal suggests two factors of the technology to be important; one: the cost of the technique for excluding people from using the resource and two: the time for adapting to this technique.

As already explained people do not see any moral or legal possibility of excluding people from using the pump put in place on public land. Therefore is no technique in place in any visited community that hinders any people from using the hand pumps.

[38] Was not clarified in Diksal, Umborgoum and Wuni Chinchale.

6.5.2 The external market

According to Agrawal's (2001) lesser articulation with the external market gives better possibility for sustainable local CPR institutions. I can not identify anyone interested in selling water from this draught prone area on the external market so this is not relevant in this case.

6.5.3 The state government

In chapter four and five I presented the villages' relationship with the government regarding water provision before the HCC program was carried out. Agrawal (2001) indicates that the central government can support or undermine the local authority. Therefore the government's role in the villages where HCC has carried out their work is now presented.

Government officials will only visit the village on request from the village Gram Panchayat. The property rights regarding the HCC installed pumps are, however, unclear. As presented above access to hand pumps on public land, which include the HCC-pumps, is never restricted. But the state government will not fund their maintenance (Bhaskav 2007). HCC wish it to be the property of the user group (Bhaskav 2007) but in many villages the village in the form of the Gram Panchayat is perceived as the owner:

> *"It´s public property, part of the Gram Panchayat."*
> (Diksal pump users 2007a)

In villages where HCC has installed some wells and trained local caretakers the government will also continue to maintain government installed pumps when requested (Gasavi et. al. 2007). This service is subsidized when government employees are utilized but there is no possibility for extracting government funds for local maintenance (ibid.). There was and is no government agency conducting external monitoring or sanctions that interact with the village on their own initiative (Gasavi et.al 2007).

The central government recognizes the local governing body of Gram Panchayat which it has instituted (Government of India 2007). Connected to the Gram Panchayat it is also possible for the village to formally introduce committees taking responsibility for certain issues, such as water committees. There is no such clear formal recognition of organized user groups.

Smaller group constructions is started to get public recognition. Outside Aurangabad women's group reported that they could get micro finance credit (Keskar 2007b) but women's groups in Pandharpur had not the possibility of getting accepted as a formally recognized group acceptable for loans (Village W 2007).

In summery, this chapter includes statements from the informants, and the observations I made, regarding characteristics of the studied groups and their institutional characteristics. This is, together with the findings presented in chapter five, discussed in the following chapter.

7. Analysis and discussion

The empirical findings has been presented as the project cycle of HCC´s water program, in comparison to the previous water regime, and as some characteristics of the local community that CPR theory has suggested to be important for the research question.

In chapter three a model specification was introduced:

Quality of operation and maintenance (Q_o) = f(P_o, A_o) + μ

where A_o is an exogenous variable and P_o is an endogenous variable given by

$P_o = f(G_1, G_2, \ldots, G_n, I_o) + \mu$

where all G:s are exogenous variables for group characteristics (level of social capital, group size etc.), while I_o is an index variable weighting the institutional settings affecting operation and maintenance.

This analysis starts with the results of the HCC water program (Q_o). After that the four areas I believe to be most important regarding the rest of the variables are discussed. The method to find these four variables has been the comparative institutional analysis. A summary of this comparative exercise is found in appendix 2 and 3.

Under each heading in this chapter I try to discuss the condition regarding the variable in the previous management regime in contrast to what changes have been induced.

7.1 A resource system suitable for local management

The resource system is of small size with very well defined boundaries, consisting of the ground water available in the bore well. The predictability of the system seems to become quite high after a few years use, when the villagers learn from experience the seasonal variation of water availability. Thus according to Agrawal (2001) the resource system as such is suitable for introducing community management.

7.2 Sustainability of local management

HCC has been installing subsidized wells in village communities for nearly 40 years. As presented in the background chapter, section 4.4, they at first restricted their work to install the well and then directly hand over the responsibility to the local community. Using this approach they experienced the great problems of pumps being not properly maintained. They have since introduced a more holistic approach, involving all villagers in the process and extended their work in the villages.

Today the indicator “user satisfaction” shows that two to three years after the installations most people are still satisfied with the services (presented in section 5.4). The problem seems to be insufficient ground water coverage in summer. I return to this issue in section 7.8, discussing the need of complementing technology.

At the time of the study all wells that had sufficient water were reported to be in working condition. This could at first be seen as an indicator that proper maintenance institution was active in all villages. But the choice of methodology has made the conclusion on the maintenance institution more problematic. One year was thought as enough time to be able to clearly find if a sustainable regime was in place or not (if the pump was working or not). Based on statements from HCC staff members that a bore well could be malfunctioning in three months if not looked after properly (Bhaskav 2007). However, the study has showed that with proper use of the hand pump it will keep on working for two years or more without any need of maintenance. Therefore it is difficult to conclude if the system is sustainable when higher pressure is put on the system as it gets older. I thus have been forced to rely on a more subjective judgement of the sustainability of its maintenance institution, a situation similar to that of Manikutty's (1998) study of another Maharashtra drinking water program carried out too early in the project cycle.

Given this restriction, findings are that the water program in the studied villages is a success. I base this on that all interviewed people could explain how maintenance is planned to be carried out once the pump malfunction. In the three villages where the wells have malfunctioned they have also been repaired within ten days. The institutional settings in all eight studied villages have moved to, with the terminology of Aoki (2005, p. 7) a new institutional equilibrium where the villagers take care of maintenance of the new installed hand pumps. In some villages the two institutional systems are running parallel, with the village doing the maintenance of the HCC installed pumps and the BDO doing maintenance of government installed pumps. Interesting is that in most villages the new management regime becomes dominant and the local community takes responsibility for all pumps including government installed pumps.

In summary, the historical information about HCC shows that their work at first did not produce sustainable local management regimes but when they have incorporated more and more activities in their program this has come to change.

7.3 Institutions

7.3.1 Participation and its incentives

Previous to HCC a centrally arranged management regime was in place and the formal responsibility of the local community was restricted to report malfunctioning.

Due to the fact that state government has not shown the capacity to quickly repair the hand pumps when malfunctioning people find economic incentives to take over this responsibility locally. This insufficient capacity of the state government is widespread all over India (see Narain 2006, Kolsky et.al. 2004). Narain (2006) finds that it has been impossible to recover cost of the capital investment and operation and maintenance of the system from the farmers. This has led to a brake down of the systems.

Most people could not privately afford to install their own bore well and thus a public solution is the possibility. The need for a specific hand pump to be in working condition is not as important in the main village as compared to an area outside the main village. Therefore the incentive for hand pump maintenance is stronger in hamlets. Outside the main village one group of users will always live close only to the one hand pump, making their connection to that specific water source strong.

Local common ownership creates the incentives for effective participation in decision making, construction, monitoring and maintenance. But the idea that drinking water should be provided by the government is deeply rooted in the minds of the villagers. They have little experience of property not being either private or government owned. For the local common ownership to be trustworthy it both demands a contribution from the villagers and clarity of the exit strategy of the implementing organization. Villagers must believe that the implementing organization will not be a backup supplier of last resort, giving support if the villagers fail to organize maintenance on their own.

Local common ownership is something that needs to be learnt. Peoples understanding of the state has to be changed. That the institutional setting does become deeply transformed is indicated by the reports of villages, after HCC:s program has been implemented, take initiative to participate in government subsidized projects with their own contribution.

In summary, from a strictly economic perspective there seems to be economic rationality for local maintenance. Important is to get people, who are not used to cooperate is this way, to trust that good things will come if they apply to some rules in a continuing interaction.

To understand more about when this approach is successful and not I now continue the search for more institutional change (not just local ownership) that accompany HCC:s programme.

7.3.2 Need of rules and their enforcement

Two areas of rules are found affecting the water system: Rules about how to use the pump properly and rules about financial contributions. According to CPR theory rules restricting access are also important for sustainable resource management.

Before HCC started to work in the program villages there were no rules about how to use the hand pump. There were no rules limiting access or the amount of water to be used. Funding was covered by a per capita tax paid by all.

HCC introduce rules about how to use the pump to minimize wear. The rules are taught orally at a training session and the villagers understand why these rules are important and quickly incorporate them. They even express that these are commonsense rules that have always been there. If someone breaks the rules they are approached by Gram Panchayat members who have the official power to enforce such rules. Based on the interviews and litterature it seems as if these rules increase the working time of the hand pumps significantly.

Strangely enough people did not seem to mind that people are allowed to use the pump independently of if they contributed to construction or contribute to maintenance or not. In the continuing use and maintenance more and more people seem to join the group contributing to maintenance. People themselves otherwise refer to “the great need” to explain why they and others contribute. There is no institution for cohesion to contribution based on formal power. That anyone contributes in this institutional setting contradicts CPR theory. But there could be other institutions making the system work, e.g. guilt or other informal rules that weren’t revealed in this study. The system for deciding individual contribution in an open meeting does probably have an enforcing effect, as suggested by Narain (2006).

Only in one village a tax system is reported to have been introduced with the new system to finance all pumps in the community by a communal fund.

The community around one hand pump had introduced water saving rules for the summer months. No other community experiencing water shortage had introduced such rules. Unfortunately it was not possible to find the reason behind this.

In summary, proper usage rules limit the need for maintenance and are followed if they are properly introduced to the villagers. Rules restricting the amount of water to use in summer were almost not found. Contribution to maintenance is not mandatory and the mechanism for making people to contribute even though they know some people do not is non-formal. The interesting finding is that the system seems to work well-enough anyway.

7.4 Group characteristics

7.4.1 A situation of limited human capital

Agrawal (2001) does not directly recognize human capital as a factor to consider but I found it interesting. It inflicts on peoples rationality. In villages not guided by an NGO there seems to be little knowledge about development possibilities and the opportunity costs of continuing to live in the traditional way.

When discussing what has been the major impact of HCC as well as discussing the exit of HCC with villagers the need for "guidance" seems to stand out. Especially when asking women they need guidance to new knowledge to a much greater extent than material things. People in the program villages to some extent now talk about their decisions in terms of opportunity costs. They have much better understanding about what is at stake.

For a participatory strategy to be successful the villagers must be guided to some new knowledge such as learning more about one's own village, learning about the possibilities available to the village and learning about the opportunity costs of not taking action. Of course it is important that this is done in a transparent manner where the villagers have the possibility of questioning the new ideas so it continues to be a participatory process.

What is left to resolve is how this guidance will be provided after HCC is scheduled to leave. Connecting the villagers to an information source seems to be needed. News media could perhaps fill this gap. One other interesting suggestion is thus from Patil. He argues the benefits of investing in village information centers with internet connection; these could be used for tracking market prices on crops, weather conditions, and information about new technology etc. (Patil in Baliram et.al. 2007).

7.4.2 A situation of limited social capital

I find most group characteristics to speak against the possibilities of these communities to be able to sustainably manage a CPR (these finding holds both for initial conditions of the program villages and of the present condition of the reference villages) (see section 6.2). If one generalize; there are no clear boundaries of the user community, the existence of previous social capital is low, the political leadership is

perceived as corrupt and mostly look to special interests of a certain group, there is low previous interdependence among group members and there is a high level of poverty. The study does not provide clarity on the other group characteristics indicated in appendix 1. The overall situation does however not seem bright. This would explain why HCC's previous approach has failed.

Outside the main villages these negative factors are somewhat balanced by what Agrawal (2001) classifies as the relationships between the resource system and group characteristics. In hamlets and for those living scattered in the fields there is a very strong dependence of the specific hand pump.

The main issue, I believe, is that of social capital. One major change in the villages that people mention is an increase in cooperation and participation in community groups. If measured, it is most likely that one can find and increase in social capital in these villages. A higher level of social capital makes it possible to overcome the negative impacts of the other group variables. I also suspect that the level of social capital is the easiest factor to influence.

The limited social capital in rural Indian communities mainly stems from religious institutions. Even though religion and everyday life is closely connected in the Indian society it seems to be a barrier of utilizing experiences achieved in the religious sphere in the development of the village. People themselves never mention religious institutions during the interviews except when asked directly about it. In only one village people mentioned the Hindu shrine as an important place due to its function as the place of everyday meetings and general discussion of the men in the community.

A little bit ironically, it thus becomes the role of a church-based NGO:s to invest in the secular social capital of the village. Because, even though not presenting it in the terms of social capital, HCC takes the lack of social capital into consideration when starting to work in a village. They see the issue of starting the work as a six month process in contrast to that of the Maharashtra government scheme which mostly just organize one meeting in the village where the whole issue is resolved (or not). One could see it as a two stage approach for social mobilization (externally assisted investment in social capital). The first part is before the installation; holding meetings where the villagers become trained in public interaction (at village level and at "corner-level"). This is also supplemented with the start of women's groups which give a needed special focus on women resulting in a more active engagement of women in village meetings than otherwise possible. The second part is continuing support of village development after the hand pump is installed or repaired. This means engaging people in other development projects and forming more and more women's groups, youth groups and farmer's groups during six years before they leave the village.

When applying a gender perspective on the issue of social capital one could clearly see that the matter of women's social capital is even more severe. There seems to be almost no female social capital available. The implanting agency thus needs to give more attention to women´s situation than men's in the initial face to get a balanced program, a program that at the end benefits women and men equally. Getting more women active will also improve the project.

One question is the clarity of the concept of "user group". Within this study it has not been possible to clarify the level of formalization of user groups. HCC refer to all communities located around one hand pump as a user group independently of if there is any regular meetings of the group, an elected leadership of the group or something else that would indicate some formalization of these groups. The level of formalization actually seems to differ greatly between different locations. The results from a study of a

program in Karnataka showed that such ad-hoc formation of user groups can work during the implementation face but has difficulties in achieving sustainable participation (Manikutty, 1998, p. 379). This indicates that HCC would benefit if they put clarity to what kind of user group functioning they envisions to be running when it withdraws from the villages.

In summary, the prevailing situation in the villages before HCC started their work was, if analyzed through CPR theory, not facilitating conditions for sustainable CPR management. Larger external investments in activities building social capital have in this case changed the situation.

According to Isham and Kähkönen (2002) social mobilization could be a sufficient intervention, but the villagers talk about different "key persons" lead me to the next conclusion.

7.4.3 A situation of available leadership capacity

CPR theorists suggests that the leadership of the community should be young and familiar with changing life conditions but at the same time connected to the local traditional elite, in order to facilitate sustainable CPR solutions. Thus I have discussed the issue of leadership and initiative with the villagers.

In the discussions with users the term "key person" was found to be a useful term to understand the functioning of the maintenance organization around the hand pump. The key person could be the repairmen, a Gram Panchayat member, a former Gram Panchayat member, the CHV or someone else. In all focus groups where the question was asked the informants could indicate a "key person" for their hand pump. That person had some sort of leadership ability that could be used to gather the users and resolve maintenance issues. Both villagers and HCC staff talked about these leaders who have been important for the development initiatives in their villagers. I believe one can think of them as social entrepreneurs.

In a book length presentation Krishna (2002), through a study of northern India, has showed the importance of leadership to see positive development result. His simple econometric analysis indicates that social capital is not enough to explain where development materializes or not, one needs also to include an agency variable. My interpretation of my primary data is that it is not that important if it is formal elected leaders such as Gram Panchayat members and leaders for committees, or people that just take initiative. The importance is the knowledge of the person and that he/she can lead by example. These people are of different ages and sexes.

There is one advantage with having some reliance on informal leaders instead of only relating to elected leaders, and that is that informal leaders seems to have a positive effect on the transparency of the functioning of village management. The CHV themselves say that they go to Gram Sabha and ask Gram Panchayat how they use the funds.

To support the people with leadership skills and to strengthen leadership capacity of the next generation could perhaps be as important as social capital for the sustainability of the development projects. Identifying these persons is of course best done with participatory methods such as PRA. Even if one work with informal leaders one must be in hand with the Sarpanch at the same time. As reported Gram Panchayat members can oppose the work.

In summary, even when working through a participatory process active local leadership, formal or informal, are needed to transform social capital into positive change for the village. A "key person" acting as a social entrepreneur could be identified as an engine for village development. In many villages there are already persons with these capacities that just have to be identified and supported by the implementing organization.

Social capital and leaders are affect rule compliance, but has the village the capacity for locally based maintenance?

7.5 Maintenance capacity

No village had previously the capacity to carry out maintenance of hand pumps. Both skills and tools were missing. Proper maintenance capacity is thus needed to be introduced in the village if it would be possible for the villagers to solve maintenance themselves.

In five out of eight villages the local care taker/-s that HCC has trained quickly becomes responsible for maintenance of all the hand pumps present in the village and the village stops applying to the government for maintenance. This is a side effect of the HCC program not planned by HCC and according to Bhaskav this is nothing they endorse actively. The logic behind this behaviour is, as mentioned, that the people do not trust the government to provide support within reasonable time.

The time the pumps are out of order during one incident of brake down is lowered to one or two days and the cost of the local reparations is seldom considered expensive if the pump is continuously maintained and the cost of this is shared among the beneficiaries. If if the goal is to maximize the water available to the people in one village it is a good practice for the village to take care of maintenance of all village pumps if the governments support does not arrive quickly enough. It lowers the number of days with malfunctioning of wells which means an increased income for the village. It would therefore be interesting to identify what factors determine the establishing of such practices. Four potential explanations to this are below compared to gathered primary data.

A first explanation is that if it is Gram Panchayat that organizes maintenance it would lead to that the local caretaker takes care of all pumps. This is however not the case; for example Village V and Medshingi have Gram Panchayat involved in maintenance but do not organize local maintenance of all pumps. Bohuli do not organize maintenance through Gram Panchayat but have local maintenance of all pumps.

One second, not too farfetched, hypothesis is that HCC pumps need to become a large share of the total level of pumps to stimulate village level maintenance of all pumps. In Narraj 4/7 of all pumps are HCC-provided but they still do not organize village level maintenance of all pumps. And Umbergoum that has only 2 out of 21 pumps provided by HCC organize village level maintenance of all pumps. The hypothesis does not hold.

It is the relation between village size and people trained that best explains, with only one exception (Narraj), why the practice of local maintenance of hand pump does not develop. There must be enough people trained in relation to total number of bore wells for the practice to develop, see table 7.1.

Table 7.1 Analysis of maintenance capacity

	Narraj	Waki	Village V	Diksal	Wuni Chinchale	Medsingi	Umborgum	Bohuli
Total local solution	No	Yes	No	Yes	Yes	No	Yes	Yes
Nr of bore wells[39]	Few	Few	Many	Few	Few	Many	Many	Many
People trained	One	One	One	One	One	One	Several	Several
Payment for caretaker	No	Yes	Yes	Unknown	Unknown	Unknown	Yes	Yes

Source: Appendix 2

One could also suspect that the level of payment to the care taker could give some effect on what practice that evolves. Regretly complete data on this variable is not available (see table 7.1) so this could not be clarified. Anyway, the data does not contradict the theory that a payment system must be introduced for the system with several people trained in one village to work. Both Umborgum and Bohuli use people with salaries paid by the Gram Panchayat.

In a program implemented in Rajastan by a NGO the trained care many times was not utilised by the village (Manikutty, 1998, p. 384). Manikutty explain this as the Panchayats preferred to have its own staff doing the maintenance work. HCC has avoided this by establish a sound relation with the village Panchayats and also educated Gram Panchyat pions in situations when found suitable, and so resources are not wasted.

In summary, to make it work the maintenance capacity must be sufficient. And it must be sufficient for the way the villagers choose to utilize it. The participatory process must thus identify the villagers demand for maintenance capacity and not see this as an issue that can be decided by an objective external part.

But even the most well maintained pump will not supply water if there is no water in the well. Therefore some supplementing technology is also needed.

7.6 Need of supplementing technology

Even though the delimitations for this paper states that this aspect should not be in focus in this paper I need to mention it here. Approximately half of the studied villages experience problems with HCC-pumps not providing adequate water in summer. These pumps are in good working condition but the water table becomes too low in the summer months.

This problem can be addressed directly by roof rain water harvesting directly connected to the well (see figure 7.1). This is already provided for the schools in Waki, Diksal and Umborgum (observation). The

[39] Few < 20, Many > 20

general effectiveness has been established by Narain (2006) and especially for the region studied in this paper by Baliram et.al who verified its effectivness (Baliram et.al 2007).

Figure 7.1 Roof rain water harvesting at a school
The pipes leads water through a filter directly to the bore well.

Also indirect water harvesting structures such as check dams (see figure 7.2) and ”continues counter trenches” (see figure 7.3) recharge wells.

Figure 7.2 Check dam
Flooding water coming from the left will stop when it reaches the dam wall. This allows more water to percolate through the ground.

Figure 7.3 Continues counter trenches (CCT)
Rain water will be stopped from flooding down the hill in the digged trenches. This allows for more water to percolate through the ground.

This study has thus only identified the problem of low water table in summer and for a solution for sustainable drinking water management this must be addressed. As stated in the limitations I do not go into discussion about how to go about with such an extended program or what the result of HCC's work in this area has been.

In summary, even a large extent of the well constructed and well maintained bore wells become dry in summer. Supplementing facilities such as roof water harvesting and continued counter trenches (CCT) is thus also needed to achieve sufficient water provision. An issue of natural resource management can never be solved without applying an ecological perspective, i.e. an awareness of that the way you utilize the resource affect other parts of your environment.

8. Conclusions

The conclusion of this study is that if we look specifically at poor communities in the Indian countryside outside major villages a locally based management regime for drinking water provision (where users participate directly in management) is preferable in relation to a central government run solution[40]. The Indian government has shown to lack the resources and capacity to maintain all hand pumps and when there is no large benefit of economies of scale it is better to have a smaller community take responsibility for their own hand pump[41]. This is because a group of people in great need of the resource, and with the knowhow of how to manage repairs, will repair a malfunctioning part faster. This has also proven to be of rather low cost because of the simple technology used.

This study shows that an external actor can use the knowledge developed by CPR theorists to develop local institutions that take care of a local public good. This said there are major difficulties in introducing this in a sustainable way indicated by the game theoretical idea of the prisoners' dilemma. I come to the conclusion that the process of creating sustainable local management regimes has three major parts, these are:

- Users participation from the beginning and right trough the project creates a feeling of ownership of the pump (even when the installation is largely subsidized). Local ownership is in turn the driving force for participation and active involvement in maintenance.

- To make the system work a broader community mobilization effort is needed in order to build social capital in the villages. In this process there is a lot to gain from making room for the local leadership on different levels. There are "social entrepreneurs" that wants to work for the benefit of their community. An important finding is also that in order for the new system to work not everyone within a community has to participate in management to be allowed to use the resource; the important thing is that the active group is large enough[42].

- Spreading awareness of how the technology should be used properly increase the lifetime of the equipment. A demand driven approach also regarding how much maintenance capacity to supply would probably increase the impact of a program. Supplying training and equipment for maintenance is equally important as installing new wells if one look to the results in the long run.

[40] Within larger villages other types of technology for water provision, such as pipelines and water towers, might prove more cost effective when economies of scale can be achieved.

[41] This is when management and maintenance is concerned. If we look at installation of new wells there are large economics of scale.

[42] My research method does not give any empirical evidence about what happens in the real long run. As commented on in the discussion in section 7.4.2 on page 51 I do suspect a lack of formal structure of the user group could have negative long run effects for the sustainability of these user groups.

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Appendices

Appendix 1. Critical enabling factors for the sustainability of the commons

Table A2:1 Critical enabling factors for the sustainability of the commons	
A. **Resource system characteristics**	1. Small Size 2. Well-defined boundaries 3. Low levels of mobility 4. Possibilities of storage of benefits from the resources 5. Predictability
B. **Group characteristics**	6. Small Size 7. Clearly defined boundaries 8. Shared norms 9. Past successful experiences – social capital 10. Appropriate leadership 11. Interdependence among group members 12. Heterogeneity of endowments of identities and interests 13. Low levels of poverty
A & B. Relationship between resource system characteristics and group characteristics	14. Overlap between resource group residential location and resource location 15. High levels of dependency by group members on resource system 16. Fairness in allocation of benefits from common resources 17. Low levels of user demand 18. Gradual change in levels of demand
C. **Institutional arrangements**	19. Rules are simple and easy to understand 20. Locally devised access and management rules 21. Graduated sanctions 22. Availability of low cost adjudication 23. Accountability of monitors and other officials to users
A & C. Relationship between resource system characteristics and institutional arrangements	24. Match restriction on harvest to regeneration of resources
4. External environment	25. Technology a) Low cost exclusion technology b) Time for adaptation to new technologies related to the commons 26. Low levels of articulation with external markets 27. Gradual change in articulation with external markets 28. State: a) Central government should not undermine local authority b) Supportive external sanctioning institutions c) Appropriate levels of external aid to compensate local users for conservation activities d) Nested levels of appropriation, provision, enforcement, governance

Source: Agrawal 2001, p. 1659

Appendix 2: Data from the program village

Table A.1 Bore well statistics

	Narraj	Waki	Village V	Diksal	Wuni Chinchale	Medsingi	Umborgum	Bohuli
Nr of government hand pumps	3	6	30	12 and all in main village.	12	40	19	20
Nr of HCC hand pumps	4	4-6	6	2-3	Unknown	6	2	4
Time since HCC pumps installed	4 years		2 years	1,5 years	1 and 2 years	1,5 and 2 years	3 years	3 years
Beneficiaries per hand pump	500	200-300	30	600 students (240 of them with hostel facilities), 200 others	150	200 - 300	150	70

Source: Authors construction based on group interviews found in the reference list.

Table A.2 Condition before

	Narraj	Waki	Village V	Diksal	Wuni Chinchale	Medsingi	Umborgum	Bohuli
Previous water source	*In village:* • Pipe line *Outside village:* • Open well (with engine) (500 m) • Tanker in summer	*Outside village:* • Open well • Bore well (500 m) • Tanker in summer	*In village:* • Hand pumps • Taps *Outside village:* • Open well • Tanker	*In village:* • Pipe line and water tower • Hand pump *Outside village:* • Open well • Tanker	*Outside village:* • Open well • Tanker • Hand pump	*Outside village:* • Open well (500 m) • Hand pump	*Outside village:* • Open well (500 m) • Hand pump	*Outside village:* • Open well (500 m, 1000 m)
Problem with precious water source	• Well dry in summer • Tanker not reliable, waiting in line • Students coming one hour earlier to school to carry water • Pipe line service costly (2 lack rupees)	• Conflict when tanker came, standing in line. • Required electricity • Less water with tanker, only 2-3 days a week • Walk 500 m. for water	• Open well get dry in summer. • Open well very deep, difficult to get water. • Water quality not good.	• Government pipe line service expensive. • Government hand pump does not supply water in summer.	• Open well deep in the summer, has been deadly accidents. • The chain of the government well close by is not working.	• Water from open well of bad quality. • Government hand pump close is not working.	• Open well 500 m away	• Open well 500 m and 1000 m away
What has changed?	• Time saving, can spend time in other work.	• Can choose when to collect water. • No dependency on electricity	• Income increase for more time spend in agriculture	• Drastic change in attitude o f people		• Have water closer • Cows are getting more milk which giver higher income (1-2 liters increase, 10-12 rupees/liter)		
Now used alternative	• Pipe line in summer (		• Pipe line in summer (see maintenance)	• Carry water in from further away in summer. • Government scheme for two month	• Open well when hand pump is temporarily malfunctioning	• Open well for watering of animals in summer		

Source: Authors construction based on group interviews found in the reference list on.

Table A.3.1 Installation procedure

	Narraj	Waki	Village V	Diksal	Wuni Chinchale	Medsingi	Umborgum	Bohuli
Who took initiative		• Elected members who saw their social responsibility, other people follow them. • Problem closely associated with their daily life so they participate happily		• HCC-staff initiated it, villagers were unaware before.	• Gram Panchayat demanded from the government. • Demand from villagers also • Women after one women drowned in open well	• Beneficiaries (not Gram Panchayat) • Initiative from women, women and men then went to Gram Panchayat.	• One key person took initiative, knowledgeable man, no political man.	
Who took decision			• First central village meeting with the Gram Panchayat, then: • People living in the area decided during a meeting lead by HCC-staff		• Some discussion locally in the area and some in Gram Panchayat	• HCC officers discussed with Gram Panchayat • Sarpanch came to the area and discussed with the villagers and they all agreed	• Decided by all members	
Criteria for placement decision	• Water availability • Center place • Preferable near road but not totally possible	• Water availability • Need of the people • Common land	• Need of the people • Water availability • Central place	• Water availability • Close to school	• Water availability • Need of people	• Need of people (remote part) • Placing not important, need of water important • Not a controversy • A controversy, people demanded it to be closer to them (10-30% not happy). Issue settled by discussion not vote	• Main point	

Source: Authors construction based on group interviews found in the reference list.

Table A.3.2 Installation procedure

	Narraj	Waki	Village V	Diksal	Wuni Chinchale	Medsingi	Umborgum	Bohuli
Contribution	• All come together, 10 families • 3500 rupees, 10% (350 rupees per head)	• Contributed sand • All people living here contributed 10% together in the form of money plus labor. • Almost all contributed • Bricks and labor • One or two hours work each	• Construction work • Stones etc. • 3500 rupees collected together • Say that some people are too poor to contribute • People give what they have; suppose I have a tractor… • So people who do not contribute to installation join later and contribute to maintenance	• 3500 rupees • Whatever material needed. • Villagers and the school • Elected leaders collect the money, respect to their word.	• 3500 rupees (10%) • Physical work	• All people • Some contributed 20 rupees, some 50 rupees.		• 10% + work
Who´s property	• Privately owned land before	• Property of the Gram Panchayat • Before public grazing land		• Public property, through Gram Panchayat				

Source: Authors construction based on group interviews found in the reference list.

Table A.4 Working conditions

	Narraj	Waki	Village V	Diksal	Wuni Chinchale	Medsingi	Umborgum	Bohuli
User satisfied with HCC-pump	Yes	• Yes	• Yes	• Yes	• Yes	• Yes, but dissatisfied that there is no road leading to the pump	• Yes	
Need of maintenance of HCC pumps?			• No	No	• One problem in two years (in summer)	• General problems with parts (one example is given)	• No	
Pumps working having enough water in summer	• No	• Yes	• No	• No	• Yes	• No	• Yes	
Problem with quality of water	• Salty					• Problem with salt according to translator from Sangola college		

Source: Authors construction based on group interviews found in the reference list.

Table A.5.1 Maintenance

	Narraj	Waki	Village V	Diksal	Wuni Chinchale	Medsingi	Umborgum	Bohuli
Gram panchyat organize maintenance	• No	• Yes/No	• Yes	• Yes	• No	• Yes	• Yes/No	• No
Water committee		• Yes			• Yes		• Yes	
Maintenance person call meeting	• Yes	• Yes	• Yes		• No	• No		• No
Informal leader call meeting	• No	• No	• No	• No	• Yes	• No	• Yes	• Yes
Village level or user group level funding	• User group level	• Village level	• Village level	• User group level (through Gram Panchayat)	• User group level	• User group level • Costly part through financed by Gram Panchayat	• User group level	• User group level
Who contribute to the maintenance	• The ten people (families), and some other people			• The users pay • 100-200 rupees so they can manage it	• People living around contribute more • All people taking care, no fixed community	• All beneficiaries contribute (no committee)	• The beneficiaries • Also school teachers	
Nr of people trained	• One (two)	• One	• One	• One	• One	• One	• Several	• Several
Gram Panchayat pion	• No	• No	• Yes	• No	• No	• No	• Yes	• Yes
Who trained for maintenance	• Middle aged man • Takes initiative all the time • Acts as some kind of social worker • Special man paid by the school for the school hand pump	• Because he was interested in that field • Had the capacity	• Gram Panchayat pion (full-time job) • Selected because of low salary demand.	• A proper person according to villagers	• A student aged 22. Now in Pune. • Eager person • Opinion he is eligible for that		• CHV • Gram Panchayat pions • One old man	• One person and Gram Panchayat pions

Source: Authors construction based on group interviews found in the reference list.

A.5.2 Maintenance								
	Narraj	Waki	Village V	Diksal	Wuni Chinchale	Medsingi	Umborgum	Bohuli
Payment for maintenance	• No	• 100-200 rupees per day from Gram Panchayat	• Ready to work for less amount					
Time for maintenance now	• 1-2 days		• In Hamlet one day because of the great need		• 10 days (in summer) Maintenance person not directly available			
Time for maintenance before				• Very long process • 2-3 month	• Long process	• 2 days		• Takes time
Local maintenance of government pumps	• No	• Yes	• No	• Yes	• Yes	• No	• Yes	• Yes
Maintenance solution before	• Villagers went to Gram Panchayat who went to municipal who send repair team.							

Source: Authors construction based on group interviews found in the reference list.

Appendix 3: Data from the reference villages

Table A.6 Basic facts of reference villagers

	Itaki	Hutakae Mangewalli
Village size	786	1600
Employment situation	• Goat rearing and agricultural laborers. • 75% migrate for 7 month	• Many daily laborers • Many migrate 6-7 month
Water situation		
Drinking water supply	• Hand pump • Open well • Water tanker • Pipe line	• Hand pump • Open well • Water tanker • Pipe line
Nr of hand pumps	7	6
Water conditions	Not enough water in summer, then they use pipe line and water tankers.	Not enough water in summer, then they use pipe line and water tankers.
Satisfaction with their water situation	Dissatisfied with the situation in summer and that there is no water management	Dry area, so great need of more water.
Water harvesting etc	No, but application for water scheme has been made	No
Institutional setup of water supply		
How is water supply financed	Through government. The village pays five rupees per 1000 l water through pipe line.	They pay water tax, one for hand pump and one for pipe line. The tax is 500 rupees per year per family.
How is maintenance solved?	Through government, the village pays 900 rupees/year.	Government property, government does the maintenance.
Estimated time for repairing	Eight days	1-2 month
Working conditions now		There are bore well in need of maintenance
Any rules about how to use the pump	No	No
Decision about placement of hand pumps		Gram Panchayat and government. Government officials come to the village and said they would put three hand pumps.
The village organization		
Gram Panchyat	Now focusing on sanitation issue.	GP meet twice a year and discuss “all issues”. “Of course women participate”. Not any special activities right now.
Do they have Gram Sabha?	No	No
Any locally decided rules?	No	No
Other scheme for the village	Starting to work in a sanitation scheme	No
Any groups in the village	Three women’s groups (since 2 years) and youth groups (since 1 year). Started when the government told Gram Panchayat who formed the groups. Satisfied with one of the groups that “is a really good group”.	No
Occasions for meeting	Festivals and cultural festivals. Festivals organized by village leaders (from Gram Panchayat and other male village leaders)	
Village property	Gram Panchayat office and temple	First said no (say they have a temple when directly asked)
Who financed the temple	All people (voluntarily gifts).	All people (voluntarily gifts)
Who is responsible for taking care of the temple	Village leaders	?
Village development		
Involvement or knowledge about schemes available to them.	Know about water schemes and hygiene and cleanness schemes. Has applied for schemes.	Central government employment scheme. Important for this village for there is no other sources of income. Don’t know about anything else.
Contact with government	BDO visits the village	Letters to Gram Panchayat but Information not transferred to the rest of the village. Government representatives only come to the village on election time

Table A.6 Basic facts of reference villagers (continuation)		
	Itaki	**Hutakae Mangewalli**
People ask for	• More drinking water • Better opportunities for education.	• Individual improvements of income possibilities. • Education • Human rights • Drinking water
Views on contribution for more hand pumps		They would pay water tax, today the tax is 500 rupees per year per family.

Source: Authors construction based on group interviews found in the reference list.

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