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# PIPES AND PRAYERS

GLOBAL CHANGES AND WATER  
MANAGEMENT IN TWO HIMALAYAN VILLAGES





# Pipes and Prayers

Global changes and water management in two Himalayan villages

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## Foreword

Hidden behind the high Annapurna range of the Himalayas, surrounded by some of the highest mountains in the world, is a place with picturesque villages, breath taking views of high mountains and prayer flags fluttering in the wind. And not at least with hospital and friendly people with a fascinating culture. This place is Upper Manang, and here did I go to carry out the fieldwork for this thesis. It was a privilege to carry out a study in a place like this and the stay was in all respects rewarding; both the fieldwork itself and the personal experience from staying so long in such a place. Also the writing process has been fulfilling and educative. It has been demanding and sometimes frustrating, but also full of satisfying moments of understanding. To write in English has been a challenge, but thanks to good help from my supervisor and fellow students the task has been completed.

I owe to thanks several people for helping me making this thesis come through. First of all I will like to thank the people of Manang and Ngawal, for their hospitality and for bearing over with my endless questions. Especially Putali, Gom Tsering and Karma for their effort as interpreters, and Tsering Lopsang Gurung at the Tilicho Hotel in Manang for his hospitality and good help during my stay. I will also thank professor Ram Chaudhary at Tribhuvan University in Kathmandu for helping me getting to Manang; and Ph.D student Prem Sagar Chapagain, University of Bergen and Tribhuvan University, who let me join some of his interviews in Manang and Ngawal.

Thanks to my supervisor, professor Tor Halvdan Aase, for encouraging and inspiring supervision; to Håvard Haarstad for help with the English spelling and for inspiring discussions and advices; to Asgeir Skålholt who also read my drafts and commented upon them; and to Pawan Ghimire for help with getting the maps right. I will also send a greetings to my fellow student at the Department of Geography, it has been enjoyable to be around with you these years! And finally I would like to thank my parents for support and care.

Bergen, 27.09.2005



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## 1. Introduction

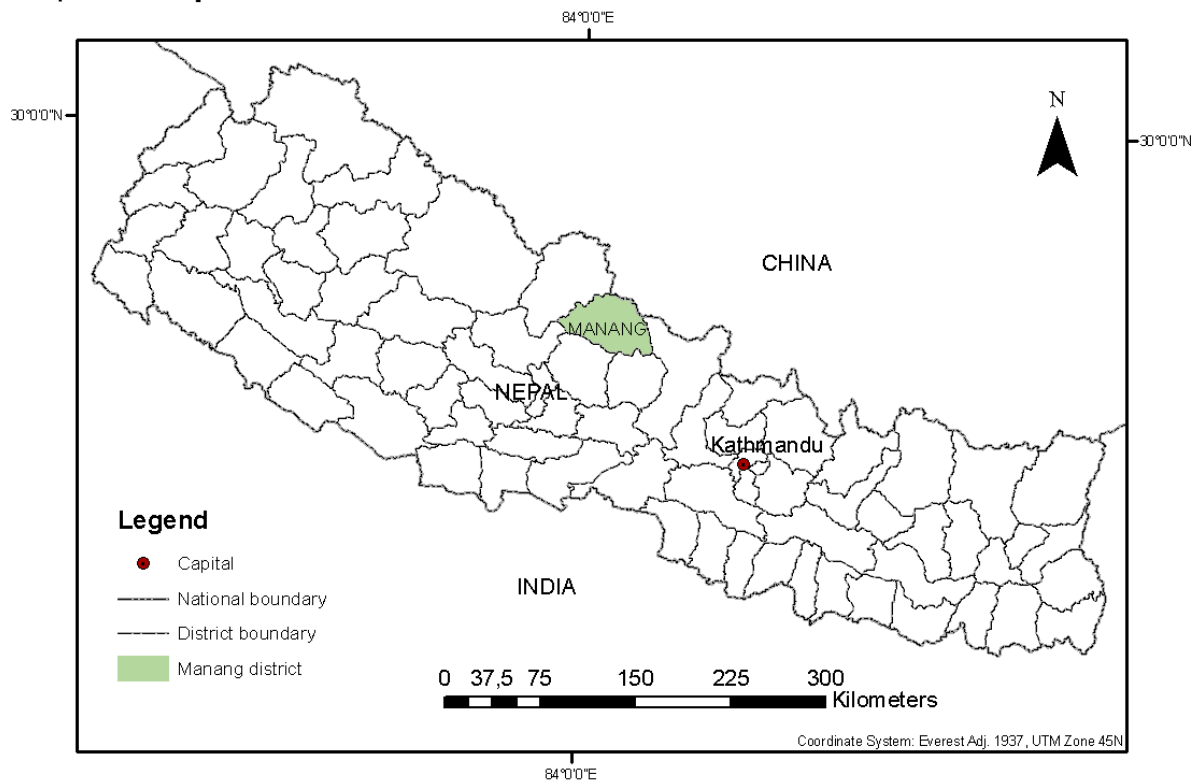
How are the people in two Himalayan mountain villages capable of maintaining their water supply in a context of global and local changes? Recently the alarm bells have been ringing over the possibility of Himalayan glaciers melting away, drying out some of the most important rivers in the world. At a micro scale this problem is also urgent. A drier climate in the mountains would alter the livelihood conditions dramatically for the affected communities.

Due to the marginal livelihood conditions that high mountain environments give, migration is a common phenomenon in high mountain communities. Migration transforms communities both socially and spatially, and might change the ability of the communities to utilize various natural resources. Also, new technology changes the communities' ability to utilize natural resources. It can make it possible for the communities to meet the challenges from climatic change and migration, given that the communities are able to change their institutions and practices in order to adapt to the new technology.

The processes mentioned are all affecting the water supply in the two communities studied in this thesis. The setting is the Manang District in Nepal (see map 1.1). It is a high mountain area, with settlements situated on altitudes between 3200 and 3800 meter above sea level. The objectives of this thesis are to study how the actual communities are able to sustain their water needs in a context of climatic change, migration and technological change; and why there have been differentiated developments in the two villages.

The findings are informed and analysed by applying theoretical perspectives from the Common Property Resource approach (CPR approach), contemporary social theory and comparative analysis of the two villages.

Map 1.1: Nepal, districts



## 1.1 Background of the study

All over the Himalayas, communities experience both climatic and social change. This is not a new situation; in high mountain communities life has always been precarious. Mountain people have always had to tackle harsh climatic conditions, unstable slopes, floods and isolation.

The Himalayas is the most recently formed mountain range on the earth and is still tectonically active. This makes the region prone to natural hazards. The precipitation is unevenly distributed during the year due to the monsoon, and this is contributing to the scope of the hazards. In the high mountain regions above 3500 m a.s.l., this implies snow avalanches and glacial lake outbursts, while the middle mountains between 500 - 3500 m a.s.l., have to cope with landslides, floods and debris flows.

And then there is the human impact on the environment. The Himalayan region has been subject of vast amounts of research on these matters (Ives & Messerli 1989). During the seventies and eighties, the alarm bells were ringing over the predicted environmental disaster which was expected to occur in Himalaya. The non-sustainable use of land, rivers and forests; population growth and political problems was formulated in the theory that Ives and Messerli called “The Himalayan Environmental Degradation Theory” (ibid). However, later research

has shown that the processes behind the so called disaster is way more complex than first assumed, and the Degradation theory is now dismantled (Ives & Messerli 1989, Chapman 1999)

Now the alarm bells are ringing again, this time over the overall threat to the water supply of the region. Population growth, intensified agriculture and the breakdown of traditional water harvesting practices are all trends that point toward a crisis due to lack of sustainable water management (Chalise 2000). And not to mention the most frightening scenario, the possibility that the glaciers of Himalaya, the water towers of Asia, are going to disappear due to global warming (Hasnain 1999 (in Vetaas 2002)). This scenario I hereafter call the “Meltdown Narrative”, as this scenario also is controversial.

Introduction of new technology and infrastructure development alter the traditional resource management practices, and some researchers (Banskota et al. 2000) fear that the non-sustainable use of natural resources, most notably forests and fresh-water, are threatening the very existence of many mountain communities. The worsening of the livelihood conditions leads to migration that fragments traditional communities and deprives them of the ability to cope with the challenges that they meet (ibid).

This is the backdrop to this thesis. The next sub-chapters present the contextual changes that are likely to influence the water supply in the two selected villages.

### **1.1.1 Migration**

Different kinds of migration are always present in high mountain communities. In places where human existence is precarious, people have to move in order to adapt to changes in their environment. It could be seasonal migration, work migration or permanent resettlement.

Migration is permanent or semi-permanent resettlement by a group or individuals (Johnston et al. 2000). Together with the fertility and mortality of a population, it is determining the size of a given population, its growth and structure.

Groups living in mountain regions have traditionally been viewed as marginalized groups, they are poorer, less educated and have poorer health than lowland groups (Ives & Messerli 1989). For marginalized groups, the mountains are viewed as shelter, a place to take refuge from war, diseases or starvation.

In the high mountain communities, seasonal migration has been a strategy to avoid harsh winter conditions, while trade ventures have been a strategy where farming did not yield enough for households to sustain a living through out the year. Permanent resettlement becomes the option when population growth exceeds what the arable land can support.

According to Banskota et al. (2000), climatic change leads to decreased productivity in many mountain communities, which again makes people migrate down from mountain areas. Additionally, there are various place specific reasons why peoples in mountain communities migrate.

Migration also has social, cultural and spatial consequences both for the places that experience out-migration and the places that experience in-migration. When a community loses many of its members, it may fail to sustain various social and physical structures due to lack of labour, while a community that experiences in-migration might become heterogeneous and fragmented.

### **1.1.2 Technological change**

All over the Himalayas, modern water supply techniques are to different degrees and extents replacing traditional water harvesting techniques (Banskota et al. 2000, Agrawal & Narain 1997). Traditional water supply methods are not sufficient to meet increased demands from a growing population (Banskota et al. 2000). The single most important component in modern water systems in remote mountain areas is the plastic pipe, the “black revolution” of water supply. Pipes make the water supply a lot more reliable, increase the overall supply and make it possible to lead water from sources that previously were impossible to exploit. But pipes require different management systems than the traditional water harvesting techniques. Maintenance of the new water system might often be problematic. In places where the government or Non Governmental Organisations (NGOs) have provided modern water systems for free, it makes people abandon their original water systems, which then deteriorate (Agrawal & Narain 1997). One reason for this can be that villagers give priority to *rent seeking*, which mean investing more effort to try to persuade the government to provide new water systems for free instead of maintaining their existing systems (ibid). And then if the water stops coming out of the pipes, entire villages might end up without water, because their traditional water systems are abandoned (ibid).

### **1.1.3 Climatic change**

Global warming and climatic change is taking place in Himalayas like in the rest of the world. The climate change has led to more extreme weather, change in precipitation patterns and higher frequency of climate related natural disasters (IPCC 1997). In the Himalayas, temperature rise has also been recorded for high altitude sites in Nepal (Shrestha et al. 1999 (in Vetaas 2002)).



The glaciers of the Himalayas make up the largest amount of snow and ice outside the polar ice caps. The Himalayas is the source of some of the world's largest rivers like Ganges, Brahmaputra, Indus and Yangtze. A substantial part of the water in these rivers is melt water from glaciers. The glaciers in the Himalayas have been shrinking since the end of the *Little Ice Age*, a climatic recession that lasted from 1350 AD to 1850, with the glaciers reaching maximum in 1850 (Mayewski & Jeschke 1979 (in Vetaas 2002)). Since the 1970ies, the pace of the retreat has increased, and according to the Working Group on Himalayan Glaciology, the glaciers in the Himalayas may disappear during the next 30 years (Hasnain 1999 (in Vetaas 2002)). A report from The International Commission on Snow and Ice (ICSI) supports this prognosis; it states that the glaciers in the Himalayas are disappearing faster than anywhere else in the world (Vetaas 2002).

This prognosis has been heavily criticised by other researchers, some predicting growing glaciers due to increased precipitation (Bush 2000 in (Vetaas 2002)). The development of the glaciers and its connection with positive and negative feedback mechanism to the climate and vegetation are uncertain and difficult to model and predict. The Intergovernmental Panel on Climatic Change (IPCC) has predicted that the Himalayas in general will get higher annual mean temperatures, more annual precipitation, increased monsoon rainfall and shrinking areas under snow, ice and permafrost (Chalise 1994 (in Banskota et al. 2000)).

The precipitation over the Himalayas is very unevenly distributed. The monsoon effect decreases to the West, and some regions are also situated in the rain shadow of the greater ranges and massifs, and are therefore less affected by the monsoon. Trans-Himalaya, the region situated north of the highest peaks, is semi-arid or cold desert. The same is true for the Tibetan plateau.

Recent reports indicate that in dry areas, high mountain farming is experiencing an increasingly dry environment (Chalise 1994 (in Banskota et al. 2000)). This is probably related to less snow in wintertime and retreating glaciers (ibid). As a result, the livelihood conditions get harsher in many places and people are migrating out from the mountain valleys and down to urban areas (Banskota et al. 2000). However, due to lack of research, there are great uncertainties regarding the change in precipitation patterns in the high mountain regions of the Himalaya. And there is still uncertainty with regard to the relation between the amount of water in streams and snowmelting, meltwater from glaciers and groundwater.

## 1.2 Selection of study area and research topic

I have chosen to study water management in the two villages of Manang and Ngawal in Upper Manang. Upper Manang is semi-arid and has an average altitude of the cultivated land at about 3500 m a.s.l. Agriculture and survival have therefore traditionally been precarious. Historically, water has probably been the most important single component in securing a good harvest (Rogers 2004). With so much depending on the availability of water, the villagers have tried to reduce uncertainty through different strategies. One of the objectives of this thesis is to investigate these strategies.

A pilot study carried out by a research team from the University in Bergen in 2000 found that the agriculture in Upper Manang was heavily dependent on glacial melt water (Vetaas 2002). To have a closer look at this assumption is also one of the aims of this thesis.

The task of securing the water supply is influenced by changes and events outside the water system itself. I have chosen to focus on migration, new technology and climatic change. These factors alter the conditions for the water supply, make old strategies and options irrelevant at the same time as new opportunities arrive. Out-migration makes maintenance and construction of irrigation canals and pipelines more difficult, and previous reports suggest that the irrigation system deteriorates due to lack of labour (van Spengen 1987). Similarly, plastic pipes have during the last 20 years reduced the need for labour for securing irrigation. But the farmers experience a drier climate. There have now been several winters with little amounts of snow, which gives low snow melting in the spring and early summer, and again creates a problematic water situation even in the village that recently had improved its water supply with new pipelines.

During my fieldwork I found out that when there is not enough water in the irrigation canals and pipelines, praying and religious rituals for water remain a rational option for the villagers. In one of the villages, introduction of pipes has created a much more stable water supply, which has lessened the labour-burden especially on women, and made people less concerned with prayers and rituals for water. In the village without pipelines, lack of rain remains critical, and rituals and prayers for water are more frequently performed in this village than in the village supplied with piped water. In order to have a broad approach to the study of which factors that influence on the ability for the two communities' ability to sustain their water needs, I also have to include the importance of religion and rituals in the analysis.

With the term *water supply* I mean the actual supply of water to the villages, while the term *water system* refer to all physical and social structures involved in supplying the water to

## Introduction

the villages. The water system consists of the *irrigation system* and the *drinking water system*. The irrigation system consists of irrigation canals, pipelines and tanks, as well as rules and conventions for maintenance and rights to use the water. The irrigation system is managed as a common, and a central question for this thesis is how its users are able to manage this system without facing breakdown of infrastructure and non-abeyance to the water-sharing rules. This task also includes investigating the actors' ability to undertake collective action in order to meet the challenges faced by their water supply.

The research topics and objectives of this thesis can be formulated as a set of research questions:

### Main research question:

*How do the villagers in Manang and Ngawal sustain their water needs in a context of migration, climatic change and technological change?*

### Sub questions:

- 1) *What are the social and physical characteristics of the water systems?*
- 2) *How do migration, climatic change and technological change affect the management of the water systems?*
- 3) *How do religion and culture affect the management of the water systems?*

As mentioned, I choose two different villages as cases for my study, because I had the hypothesis that their water supply situation was different. I therefore wanted to find out what factors that eventually lay behind those differences. This can be formulated as a methodological, comparative question:

- 4) *Which factors can explain the differences between how Ngawal and Manang sustain their water supply?*

This question serves to highlight the factors and processes influencing the ability for the inhabitants in the two villages to sustain the water supply.

The next chapter introduces the theoretical approaches used to inform the empirical findings from the field study.

### 1.3 Developing a theoretical platform

In the villages in Upper Manang, water for irrigation as well as natural resources like forests and pastures are managed as commons. Studies of commons inevitably give associations to Garret Hardin's article "Tragedy of the Commons" (1968), which describes how over-use and deterioration is the result when several users have free access to a limited resource. "The Tragedy of the Commons" has become a powerful narrative, and has coloured research on commons since it was published in 1968. Together with other classical models from game theory and institutional economics, like the "Prisoners Dilemma" and the "Free-rider problem", it gained huge influence on policies for natural resource management (Ostrom 1990, 1994; Edwards & Stein 1999).

The dominance of The Tragedy narrative stirred a massive research effort on self-governed commons, and a huge pile of successful cases was displayed. These were followed by a development of theoretical frameworks for self-organised commons management, like Wade (1988), Ostrom (1990) and Balland & Platteu (1996), which is called the Common Pool Resource approach (CPR approach) to natural resource management. The CPR approach discusses which factors and conditions that enable users to take collective action for a sustainable use of a CPR, as well as presenting principles for sustainable management institutions of CPRs. I have found the CPR approach useful for analysing the management of water systems in Upper Manang, and have chosen to use Ostrom's framework (1990) for the analysis of the water management system in Manang and Ngawal. I chose to use Ostrom's framework because it seemed to be the most comprehensive approach, and the most influential one according to related literature (Edwards & Stein 1999, Steins et al. 2000, Agrawal 2001, Pedersen 2002)

But my research questions also deal with how processes of social change affect the ability of villagers to sustain their water supply. In order to discuss this aspect and for analysing the importance of the contextual changes mentioned, Ostrom's framework does not suffice. The CPR theories are founded on new-institutional economics and rational choice theory, which are criticised for giving little emphasis on social and cultural matters (Agrawal 2001; Edwards & Stein 1999, 2000; Mehta et al. 1999; Cleaver 1999, 2000) and on non-local contextual factors (Agrawal 2001, Steins et al. 2000).

Irrigation is a way for humans to adapt to the environment, and from this perspective this study can be said to be one of human ecology. Human ecology can be defined as the study of: "The role of physical environmental factors in shaping, limiting or determining

various forms of group shaped behaviour and the regularities which lie behind them” (Berry 1976, 10 (in Coward 1986)). The aim is to avoid viewing social processes as independent from the physical setting in which they occur.

I find the CPR approach useful for analysing water system management, but in order to extend the analysis to cover how social and physical changes affect the communities’ ability to sustain their water supply, I found it necessary to include concepts from an ontological foundation different from the rational choice logic and methodological individualism underlying the CPR approach. I have chosen to apply *local dialectics* (Aase 1998), which can hopefully clarify how changes in praxis, institutions and culture are interrelated through a dialectic process (ibid). I will apply the concepts from local dialectics when discussing how contextual changes influence on the two selected communities’ ability to maintain their water supply.

These theories will not be applied uncritically to the empirical material; rather, their validity for my purpose will be tested. Thus, two theoretical research problems can be formulated in addition to the empirical ones:

### Theoretical Research Questions

- 1) *Is CPR theory in general, with emphasis on E. Ostrom framework (1990), suited for analysing the management of water systems in Manang and Ngawal?*
- 2) *Is it useful to apply the concept from local dialectics (Aase 1998) to study the effects of contextual changes on the water supply situation in Manang and Ngawal?*



Pic. 1.1: Farm house in Manang village. Annapurna II (7937) in the background.

## **2 The study area - Upper Manang and its people**

This chapter introduces the geographical setting of the study area and the people who inhabit it. The history of the people of Upper Manang and especially the development in the latter half of the 20<sup>th</sup> century has great importance for the research topic of this study. This especially concerns the contextual changes underlying the out- and return migration in the area, the importance of the international trade in Upper Manang, and then the rise of Upper Manang as a tourist destination.

### **2.1 Geographical setting**

North of the high mountain ranges of Annapurna, where the vast highland of Tibet begins, is the upper part of the Manang District (see map 2.1 and map 2.2). It is a highly mountainous area, with only one valley of arable land and settlements, the Marsyangdi Valley. The elevation of the area extends up to the peak of Annapurna 1 at 8055 m a.s.l., and the settlements are situated on altitudes between 3200 and 3800 m a.s.l.

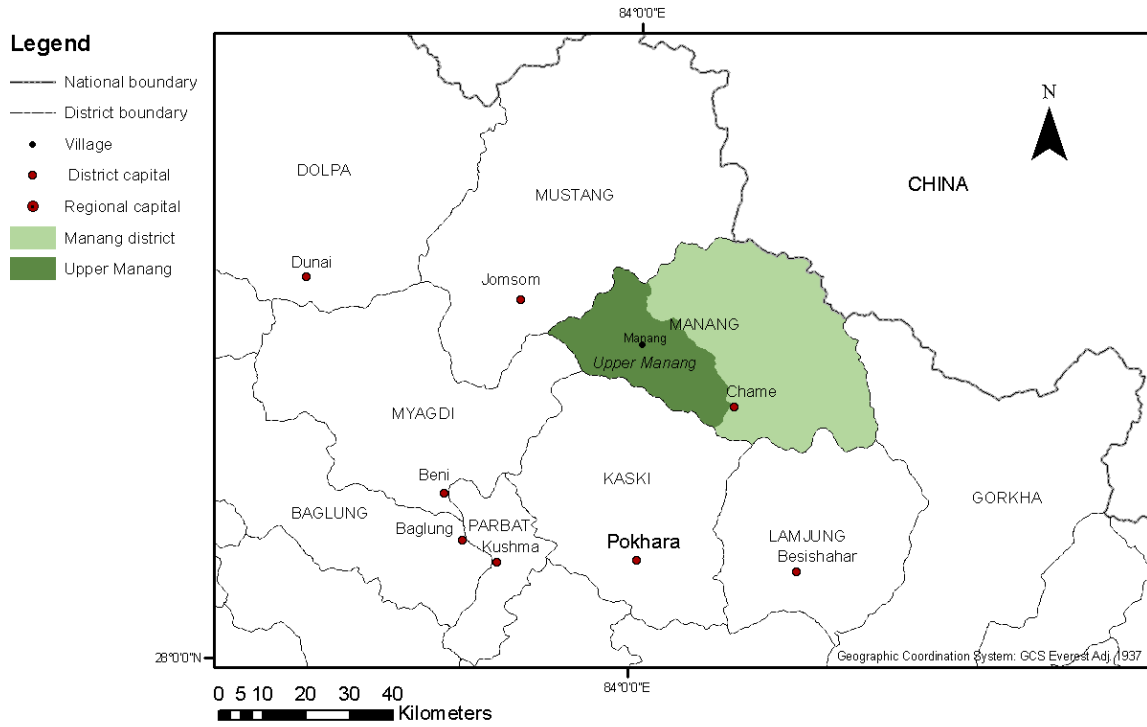
The Manang District can be divided into three areas: Lower Manang, which consists of the lower Marsyangdi Valley and its branches; the Nar-Phu area, which consists of the Nar and Phu valleys; and Upper Manang, which also is called Nyesheng, which is the northern Marsyangdi Valley and its tributaries.

Upper Manang can also be defined in respect of climate, because it differs significantly from the lower part of the district. Where Lower Manang ends, and Upper Manang begins, the Marsyangdi Valley makes a turn westwards, north of the Annapurna Range. The major cloud systems are coming from the South or West, and Upper Manang is therefore in the rainshadow of the Annapurna Range. The area receives little rainfall, and can be characterized as semi arid.

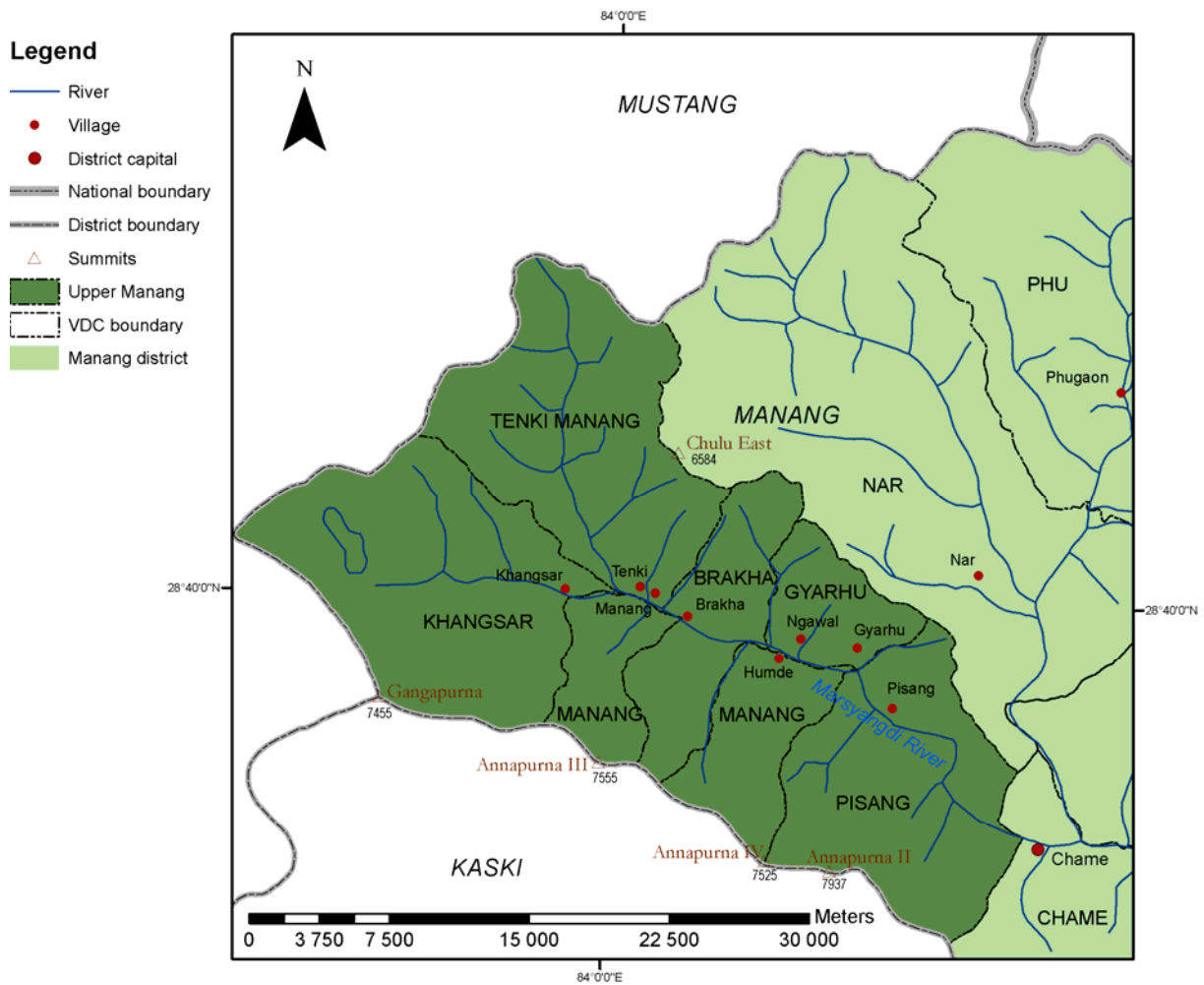
Upper Manang can also be defined through access. Until the sixties, the trail down along the Marsyangdi had some exposed and difficult sections in gorges. This made the use of pack-animals impossible. The monsoon regularly swept away the trail, and left the Upper Manang isolated from the South, with exceptions from the Kang La pass to the neighbouring Nar valley at 5321 m a.s.l.

The study area – Upper Manang and its people

Map 2.1: Manang and surrounding districts



Map 2.2: Upper Manang





Due to the altitude and the dry climatic condition, vegetation is steppe-like, but varies considerably with altitude, sun exposure and microclimatic conditions. Pine is the dominant tree, and there are some stands of birch. Birch make out the timber line at about 3900 m a.s.l at north facing slopes, and at 4500 m a.s.l. at the south facing slopes. Juniper is common in all altitudes up to 4500 m a.s.l.

## 2.2 The peoples of Upper Manang

Upper Manang can also be defined by the people who inhabit it. They are called *Nyeshengba* or *Manangba*. *Manangba* is the term used by other ethnic groups in Nepal, while Tibetans refer to people from Manang as *Nyeshengba*. Hereafter, I will term people from Upper Manang as *Nyeshengba*, and people from the village of Manang as *Manangis*. The seven villages in Upper Manang are all inhabited by *Nyeshengba*. The villages of Upper Manang are Manang, Tenki Manang, Brakha, Humde, Gyarhu, Ngawal and Pisang. Tenki Manang and Humde are inhabited by people from Manang village. Manang, Brakha and Ngawal are the oldest villages in Upper Manang. These settlements have probably evolved around Buddhist monasteries. Manang is probably a resettlement of an older site, Bodzo, where the most important monastery in Upper Manang still is situated. The establishment of the early monasteries is surrounded by myths, but they were probably established in the 15<sup>th</sup> century (van Spengen 1987).

The border between Nepal and Tibet does not follow the Trans-Himalayan range. There are a number of valleys stretching north from the greater massifs and into the Tibetan plateau, with high mountain passes. These valleys have therefore been inhabited from the north and came to belong to Tibet culturally and, at some point in history, also nationally. In some way this is also true for Upper Manang. It has no easy entry into Tibet, but it still belongs culturally to Tibet.

According to what Manangi informants say, they came from a place not far from Lhasa in Tibet to Upper Manang 300- 400 years ago. At that time, the area had already been inhabited for a long time, by other groups of people from Tibet. According to Jackson (in van Spengen 1987), it is likely that the first settlements of *Nyesheng* date back to the 7<sup>th</sup> century, looking to what is known of the earliest settlements of neighboring Mustang and the migration of the Gurungs from Tibet southwards. The first known settlement by a Tibetan group, the Gurungs, took place in the 12<sup>th</sup> century, and they moved in from Tibet via the Nar-Phu valleys (ibid). In 14<sup>th</sup> century, Ghale clans moved in from Tibet and settled in the Nar-

Phu valleys, and from there into the upper Marsyangdi valley. The Ghales established a kingdom in Ngawal, and after a while the Gurungs and the Ghales mixed (ibid). Then in the 16<sup>th</sup> or 17<sup>th</sup> century the Nyeshengba migrated into the area, and they probably gradually mixed with the Gurung and Ghale population, according to Manangi informants.

### **2.2.1 Ethnicity and Religion**

Most Nyeshengba today prefer to call themselves Gurung or Ghale, and many also claim to belong to the Gurung ethnic group. On the other hand, they also claim to be an ethnic group on their own. However, the Gurungs do not recognize Nyeshengba as Gurungs. Neither do other Nepalis (Aase 2002). So it is difficult to find the indicators that define the Nyeshengba as an ethnic group. Perhaps the most important indicator they have, their own language. It has been classified as belonging to the Tibeto-Burman family of Sino-Tibetan languages (Mazaudon 1978 (in Rogers 2004)), and is a mix between Tibetan and Gurung language.

The Nyeshengba practice Tibetan Buddhism. Buddhism came to upper Manang with the Ghales in the 15<sup>th</sup> century, but coexisted with the animistic Bon religion up to present time. The Bon religion is an animistic religion that worships spirits in nature. Bon worshippers have traditionally practiced blood sacrifices. According to the Lama in Manang, there are black and white bon. Black bon is the direction that practices blood sacrifice, and this is not welcomed by Buddhists. White bon does not practice blood sacrifice and can very well coexist with Buddhism. According to the lama, no one has practiced black Bon in Manang for 20-30 years. Religion has always had a very important part on life in Upper Manang. The days are filled with different rituals and prayers.

The Nyeshengba have their own hierarchical system. The highest-ranking families are those who can trace their lines back to Ghale clansmen. Secondly come the Gurungs. Further down are people that more recently have immigrated from Tibet, and at the bottom is the blacksmith caste. The younger informants in Manang claim that this caste system is dissolving, and everybody seem to agree that today, wealth is the most important contributor to social status. This is also mentioned by van Spengen (1987). Parents want their children to marry other Nyeshengba, of Gurung or Ghale descent. Several younger Nyeshengba I have met had married Tibetans, but in all instances that had happened against the will of their parents, they said.

### **2.2.2 Traditional livelihood strategies**

The people in Upper Manang have traditionally relied on farming and trade to sustain their living. In the relatively harsh climatic condition in Upper Manang it has never been possible to sustain a living for a whole year from what can be harvested on the farms. Traditionally, labour is the critical input factor in high mountain agriculture, but in the semi-arid Upper Manang lack of irrigation has probably been the major obstacle to agricultural productivity (Rogers 2004 and local informants). Even when the arable land around the villages was fully exploited and hired non-local labour were used in parts of the season; farming activities has only been able to sustain the communities for approximately eight months during the year. Different strategies to cope with this situation were adopted. Trade and seasonal migration in wintertime were common, as it still is. Strategies to keep the population growth under control were also adapted. According to informants in Manang and Ngawal, until thirty years ago, an average couple would have about ten children. It was customary that the oldest son should leave the village when he became 16 years old and seek success in business outside the valley. The second eldest was sent to a monastery to become a monk. If most of the children were daughters, one of them could also be sent away to a monastery to become a nun. When these children were removed from the household, there were fewer mouths to feed. Also if the children who were sent to monasteries became monks and nuns, they would rarely move back to the village, get married and have their own family. Population growth was also reduced in more macabre ways. Until the sixties, twelve young women were killed as a sacrifice every third year. Aase (unpublished) writes that this tradition, irrespective of its cruelty, had a demographic function.

The food supply was dramatically improved by the opening of a new trail along the Marsyangdi River between Chame and Bratang in Lower Manang in the late sixties. Before this new trail was blasted out of the cliffs in the river gorge, the trail was so difficult that horses could not go to Upper Manang, and during the monsoon the trail could be totally damaged by landslides, leaving Upper Manang isolated from the south. When the new trail was finished, it meant that mule caravans could reach the villages of Upper Manang (Rogers 2004, local informants). Then rice emerged as the staple food in Upper Manang, according to Manangi informants. The new trail, as well as other remarkable development achievements were to a large extent the accomplishment of one man from Manang that represented the Manang District in the National Parliament in the seventies. According to Manangi informants, it is thanks to him that Manang has become a tourist destination. It was supposedly his achievement that the airstrip in Humde was established, which dramatically



Pic. 2.1: Traditional agriculture in Upper Manang: The man uses the plow while the women goes behind and set potatoes

reduced the isolation of Upper Manang. And almost more remarkably he persuaded the villagers in Upper Manang to give up their weapons. In the seventies, Upper Manang used to be full of guns, and was a place not welcoming to outsiders. After the Chinese invasion of Tibet in 1959, the Khampa rebels who fought the Chinese occupants took hideout in Upper Manang and other places nearby the border. They were also terrorizing the native population, and therefore the Nyeshengba armed themselves. After the Khampa resistance ended in 1975, the Nyesengba still kept their guns. Rival gangs were fighting, and the first trekkers who arrived were kidnapped and ransomed (Stevenson 1997). The situation was not very welcoming for outsiders. This was the situation when the Parliament member persuaded the villagers to voluntarily hand over their guns to the Royal Nepal Army.

With the population unarmed, eased access due to the new trail and the airstrip, things were prepared for the rise of Upper Manang as the tourist trekking destination it has become today. But there are more factors behind this development, most notably the remarkable history about the traders from Upper Manang.

### **2.2.3 The Nyesheng traders**

Trade has always been a livelihood strategy among the peoples living in the Trans-Himalaya, due to the marginal farming output. But the Nyesheng traders have over time become among the most successful businessmen in Nepal. Here follows a short version of the history of the Nyesheng trading tradition: Traditionally, Nyeshengbas used to move down from Upper Manang when the winter arrive. In earlier centuries, they brought herbs, gems and scented

glands from musk deer from Manang and Tibet down to the hills and the Terai, and brought grain and household necessities back.

Due to some reasons that are still not known, the raja of Lamjung granted the Nyeshengbas special trading privileges in 1784 (van Spengen 1987). The privileges granted the Nyeshengba traders right to bring their stocks freely over the border. These trading privileges were confirmed and continued by later kings and courts until 1976, when they lost their custom privileges.

The Nyeshengba traders were enterprising, and from small trade in gems and herbs on the Ganges plains of India in the late 19<sup>th</sup> century, they soon spread their trading activities through all bigger cities in the South East Asia. The King Mahendra of Nepal granted passport to the Nyeshengbas in 1962 and extended their duty free trade privileges (van Spengen 1987). In the seventies, the Nyeshengba traders started to invest their accumulated trade profit in Kathmandu. They built or bought themselves homes in the city, and started to run cafes and hotels. It was in the Thamel area of Kathmandu that most Nyeshengbas preferred to settle at that time (Aase 2002). Due to their special passport privileges, the Nyeshengbas used to be the only Nepali ethnic group who regularly traveled abroad. So when Nepal became popular among Western tourists, the Nyeshengbas knew exactly how to make cafes and hotels with an international atmosphere where the tourist felt at home.

The global connections of the Nyeshengba traders had consequences for life in the villages of Upper Manang. The traders brought home impulses and items from abroad, like kitchen equipment and fancy clothing. They also brought money, and in Upper Manang, prices were set by local conditions, and had little to do with the prices in the rest of Nepal (Rogers 2004). The Nyeshengba require wages that are far higher than in rest of Nepal, and they therefore do not bother to do work that hired labour can do at a cheaper rate, like portering and construction.

From the late sixties and until the beginning of the nineties, there was a steady out-migration from the villages of Upper Manang to Kathmandu and Pokhara. There became a growing Nyesheng community in Kathmandu, due to the business opportunities there. Similarly, land and houses were abandoned in Upper Manang. van Spengen (1987) described communities that have problems to sustain the traditional agriculture, with deteriorating irrigation canals, terraced fields and houses. Similarly, the increased income among many of the farmers in Upper Manang made it possible to employ more labourers from Lamjung and Gorkha, as well as consuming imported food like rice. The dependency from farming activities undertaken by Nyeshengbas themselves decreased. Some of the abandoned farms

were taken over by immigrants from the near-by valleys in Nar-Phu and Dolpo. The immigrants are not allowed to buy the land or the houses, but have to rent it from the native owners who typically reside in Kathmandu or Pokhara.

#### **2.2.4 The emergence of Upper Manang as a tourist destination**

In the mid- nineties, the net out-migration in Manang and most of the villages in Upper Manang seemed to decrease, and some villages, most notably Manang, experienced a return-migration that increased the number of people living in the village. The 2001 population in Upper Manang was 2284 according to Nepal Government Census, while it was 1846 in 1991 (Rogers 2004) There are two major reasons for the return-migration: The first is that most of the countries in South East Asia impose strict visa regulations on Nepali travelers, thereby making the opportunities for international trade difficult for the Nyeshengba businessmen. The second reason was the increased business opportunities in Upper Manang. The Nepali Government opened up Upper Manang for tourists in 1979, and Manang slowly started to attract tourists, who mainly went for the Annapurna Circuit trek. In 1994, the Annapurna Conservation Area Project (ACAP) was launched, which among other things supported the development of environment friendly tourism. Nyeshengba settled in Kathmandu saw the increasingly difficult situation for international trade, and the increasing numbers of trekkers visiting Upper Manang. And many of them moved home to their village in Upper Manang and built hotels, trekker supplier shops or just tea shops. Funding was arranged through an already long time existing financial network within the Nyeshengba community (Rogers 2004). A tourism agency, Destination Manang, has been established, which promotes Upper Manang as a tourist destination. The return-migration and growth in tourism related activity have been greatest in the villages along the main trail, as Pisang, Humde and Manang.

These patterns of migration that are described in the three last sections, affect the communities both socially and physically and alter the villager's ability to sustain their water supply. These processes I examines more thoroughly in section 7.2.3 by concepts and methods from local dialectics.

## 2.3 Governance

The State of Nepal has four administrative levels: Development regions, zones, districts and Village Development Committees (VDCs) or municipalities. The VDC means both the area governed by the VDC, as well as the committee itself. The VDC is the smallest administrative unit in the Nepali state. The VDC is elected and consists of a chairman, a vice chairman and elected representatives whose number depends on the size of the VDC.

Due to the Maoist insurgency in Nepal, there has not been held local elections since the last period expired. In Manang, the VDC is therefore headed by an appointed group of five persons. The area occupied by the village of Manang is divided between two VDCs, Manang VDC and Tenki Manang VDC. Because of the postponed elections, the VDCs are joined together and the VDC chairmen are not formally elected. The current chairmen were appointed during a village meeting, called the *Panch Chong*. For all kinds of matters of importance for the community, the men of the village gather in *Panch Chong*. This regards all kinds of natural resource management or thing regarding the governance of the VDC, like for instance change of irrigation rules or punishment of serious poaching. These meetings are held on an *ad hoc* basis and not on a regular basis. Due to tradition, seniority and clan relations give the highest influence to the participants on these meetings. These meetings are also a part of what the Manangis call the *manange parampara*, or just *parampara*, the nepali word for traditions. *Parampara* governs for instance most of the schedule in the agriculture, like what time the farmers shall do the harvest and what time the cattles can be taken down from the pastures.

The VDC is the most important formal institution regarding governance. It works as an inheritor of the traditional governing system of the Nyeshengbas. This system followed the *parampara*, and at that time a headman called *Khamba* governed the village. The *Khamba* had a vice chief called *Lensing* and advisors called *Falasing*. The *Khamba* was appointed by the villagers on the basis of seniority, for one year at the time. The *Falasing* had a more permanent position and could sit for a long time if he did a good job. Informants in Manang said that the VDC system could be compared to the traditional system, with the chairman as the *Khamba*, and the Vice Chairman as the *Falasing*. But the VDC system is better, they said, because now they could elect a chairman by skills and not age.

My impression was that village men who had been successful in business got a high influence in the village when they returned, even if they had been absent from the village most of their grown up life. All of these had started a lodge, café or trekker shop.

The VDC receives a small sum of money from the government for different kind of development work. Schools, healthpost and other services are not the responsibility of the VDC, but are the responsibility of different Governmental Offices represented at the district level. If the villagers want any action from the government, they do it through the VDC.

### **2.3.1 The Annapurna Conservation Area Project**

In 1997, the Manang District became part of the Annapurna Conservation Area Project (ACAP). ACAP is an alternative to the national park model for nature conservation and its goal is to conserve nature and promote rural development at the same time through education and training of the inhabitants of the ACA. Instead of using national park rangers, ACAP trains village committees in nature conservation. ACAP has introduced solar heated showers to the hotels, as well as kerosene- and propan stoves to both hotels and teashops, to decrease the use of firewood. ACAP works through several village level committees that they establish themselves. These committees are: The forest management committee which manage the forest of the village; the mother group consisting of village women, which work with social issues; and the village conservation and development committee (VCDC), supposed to be the most important one, which is the link between ACAP and the village population. If something does not work well in a village, the VCDC may request assistance from ACAP.

Local people have diverging opinions of ACAP. They see that ACAP contributes to the communities in some ways. On the other hand, people do not care about the regulation on natural resource management that ACAP is trying to impose. One informant told me that “ACAP is just like the old system of Manang, we also used to conserve forest and wildlife” (Manangi farmer and lodge owner). In Manang and to a greater extent in Ngawal, many of the informants were very disappointed with ACAP, because they had believed that ACAP was supposed to provide more development facilities than it was actually doing at the time.

## **2.4 Farming system and irrigation in Upper Manang**

Agriculture is the dominant occupation in Upper Manang, and most households rely heavily on subsistence farming. The farming system is low-intensity and paleotechnological, according to Turner & Brush' classification system (1987); with little interaction with markets and low input of technology and green revolution components like fertilizers, pesticides and high-yielding varieties of grains. A farming system is “any level of units engaged in agricultural production as it is wedded in social, political, economic and environmental



contexts” (Turner & Brush 1987, 13). A farming system then can be said to consist of several sub-systems. According to Ruthenberg (1971), each must be examined in order to analyse the farming system as a whole. An irrigation system is also a sub-system of a farming system, and is what I will present more thoroughly later in the thesis.

The conditions for agriculture in Upper Manang are probably among the most difficult in the world. Manang District has the highest proportions of steep slopes in the country of Nepal, the lowest proportion of cultivated land and the lowest amount of cultivated land per person (Zurick & Karan 1999 (in Rogers 2004)). Due to the rain shadow, the climate is dry, and irrigation is necessary to secure the harvest. There exists no precipitation data for Upper Manang, but the annual rainfall is probably around 300 mm, with 50 to 100 mm deviation (van Spengen 1987). The farming season lasts from the beginning of April to the beginning of October.

The fields are situated on terraces and alluvial fans, all south-facing or situated on the riverbank of the Marsyangdi River, and all are situated around the villages. Due to the altitude, there are no fields at places where there is little sun, and therefore there are no fields on north-facing slopes. Further is access to irrigation an important factor regarding the location of the fields.

In Manang, most households have between 6 and 15 plots of land, while the number is slightly lower in Ngawal. There exists no terminology to describe the size of the plots, but they tend to be quite similar in size. The land is managed in terms of ownership or rent. The land management follows the *parampara*. Only people from the village may own land, and it is therefore not allowed to sell land to someone from outside the village. There is a huge surplus of fields due to the out-migration in the past, and many households are share croppers, paying a share of the harvest to the out-migrated land owners. The size of this share is normally one third of the harvest. Share croppers are mostly immigrants, who are not allowed to own land.

The most important cultivated species are wheat (*shou*), buckwheat (*kepra*), barley (*kahru*) and potatoes (*alo*). Besides from this, most farmers cultivate a wide selection of vegetables. Due to the climate, the farmers can only harvest once a year. Nowadays, rice has become the most important food item, together with wheat, buckwheat and potatoes. Barley, wheat and buckwheat are the dominating grains used for making *tsampa* porridge, beer (*shying*) and animal fodder. In Manang some farmers are also able to sell a little surplus of buckwheat to purchasers in Kathmandu. In Ngawal barley also has a strong position, but the cultivation has declined, as some Ngawali informants said, because compared to wheat it

gives less production per unit of land and is more difficult to harvest. Potatoes have become more popular the last ten years due to demand from tourism. Potatoes are also popular because they require little water and can be grown in lower quality soil.

In Manang most households keep cows and goats, but not all households keep oxes. An important reason for keeping goats and cows is the manure. Besides from that, goats are primarily kept for trading purposes and secondarily for meat. In Ngawal, only a few households have goats. Cows are only milked in the autumn. In Manang, all the households have at least one horse, and in many households all except the smallest children have their own horse. In Ngawal there are some households without horses. Many households in Manang and Ngawal also have yaks. People who own many yaks are referred to as rich.

All the animals are kept down in the valley from the last fields have been harvested in September until the sowing starts in the beginning of May. Owners of domestic animals that are found in the fields during this time will be fined.

#### **2.4.1 Irrigation in Upper Manang**

According to Coward, irrigated agriculture can be defined as:

*A landscape to which is added physical structures that impound, divert, channel or otherwise move water from source to some desired location. These structures are operated cooperatively for the purpose of producing food or fiber (Coward 1980, 18).*

The type of irrigation found in Upper Manang is surface irrigation (see pic. 2.2). The irrigation canals are leading water from nearby streams. The canals mostly consist of just a ditch in the soil, but in Manang, open irrigation canals have to a large extent been replaced by plastic pipes. In Ngawal there are almost no pipes, but some of the canals are reinforced by concrete. In Ngawal, hollowed out tree trunks, called wooden pipes by the English speaking informants, are also used as canals a few places.

The farmers divert water from the nearest canal to their fields by using a shovel. The fields are prepared with a pattern of deep furrows that they divert the water into. It is the women's job to irrigate. But if the household has few women, the men will also do this job. In Manang all cultivated fields are irrigated, but in Ngawal there are still a few cultivated plots that are not irrigated. These are rented by immigrants.

The District Agriculture Office (DAO) is trying to introduce sprinkler irrigation, and in Manang, this kind of irrigation is quite widespread for vegetable fields. The farmers say that they have supplied the sprinklers themselves, not the DAO.



Pic 2.2: Two Ngawali women are irrigating their field by diverting water from a canal into furrows.

## 2.5 Manang village

Manang village is the largest village in Upper Manang, and has for long been the central village in Upper Manang. It is situated on a terrace above the Marsyangdi River (see map 5.1). Manang village consist of an old part containing approximately 500 houses/farms, of which approximately 200 are abandoned, according to the local informants. Additionally, the village has gotten a new part consisting of lodges, restaurants and trekkers shops.

Most of the inhabitants of Manang village are native Manangis, but there are some Tibetan, Dolpo and Nar-Phu households. The latter two are also groups of Tibetan origin living in the Dolpo region north of the Daulaghiri Mountain range, and from Nar-Phu valleys that are neighbouring valleys to the Manang valley (see map 2.2). According to my survey, only one of 32 respondents asked was not native. There are many young men in the village. The accurate number of inhabitants is difficult to measure. The number given in official Nepali censuses is highly questionable. When people in Manang told the census



Pic. 2.3: Manang village from North West.

**Table 2.1: Population of Manang (also inclusive the Tenki, Humde and Julu settlements)**

<i>Year</i>	<b>1979</b>	<b>1991</b>	<b>2001</b>
<i>Population</i>	1810	698	920

1979 Data from village government record referred by Cooke (1985, 186) (in Rogers 2004), assuming five persons pr household. 1991 data from the Nepal Government census. 2001 data from Nepal Government data referred by Rogers (1994, 16), assuming four persons per household.

officials about how many people they have in their household, they tend to include family members living outside the district. Most of the villagers are also migrating down to Katmandu or Pokhara in the winter, and some are only staying in Manang during the peak of the trekker season. In 1981 when van Spengen visited the village, he found that men between 15 and 45 were absent due to trade and replaced by hired labour from the Lamjung and

Gorkha districts (van Spengen 1987). This picture does not fit anymore. Nowadays, there are almost as many men as women in Manang, and my survey did not tell of a very high number of men living outside the village. In the households asked, 16 percent of the male household members were living outside the village, and six percent of the female. Manang has probably had the largest return-migration of the villages in Upper Manang, according to ACAP officials. In 1994, the ACAP official told, 13 families resettled in Manang, and in the following year there were several families moving back each year, but not in such high number as in 1994. But until 15-20 years ago people moved out every year, another informant told. There was a regular boom in the tourism business in the mid-nineties. Where there had only been a couple of simple lodges, there suddenly rose 13 lodges the next ten years. Today there are 17 lodges in Manang. The advantages of living in Manang compared to Kathmandu or Pokhara was first of all the cost of living, according to the local informants. In Manang there was no house rent, the food is much cheaper and they like the life in Manang. As a young informant told: “Even if you do not have any money, you can still have a good life in Manang as long as you work a bit on your family farm” (Manangi farm boy). All the hotel- and trekker shop owners had until they build their hotels been living outside Manang, many of them had not been living in Manang since childhood.

All the big lodges have workers from other districts, mostly Gorkha and Lamjung. These workers do normally work at the lodges in the peak season, and go back to their home in summer time and winter times. I rarely saw any of these people working in the fields. Nevertheless are the Manangi farmers dependent on these seasonal workers during the harvest. All the native population of Manang is engaged in farming activities in one way or another. Nearly all the households have their own fields and undertake subsistence agriculture. In Manang, a huge proportion of the households have one or more members engaged in non-farming activities, like having a lodge, a restaurant or a trekkers shop. But I also saw lodge-owners going behind the oxes ploughing the fields.

## **2.6 Ngawal**

Ngawal is one of the oldest settlements in Upper Manang. It is situated on a terrace on the south facing side of the valley, approximately 250 meter higher than the valley floor, at an altitude of 3700 meter above sea level (see map 5.4). It consists of nearly 100 houses/farms,

The study area – Upper Manang and its people

of which approximately 50 are inhabited (When I was trying to map this, people said numbers between 70 and 40, most people saying around 50).

**Table 2.2 Population of Ngawal and Gyarhu**

<i>Year</i>	<b>1979</b>	<b>1991</b>	<b>2001</b>
<i>Population</i>	-	306	383

1979 Data from village government record referred by Cooke (1985, 186) (in Rogers 2004), assuming five persons pr household. 1991 data is from the Nepal Government census. 2001 data is from Nepal Government data refered by Rogers (1994, 16), assuming four persons pr household.

Ngawal have faced significant immigration from the Nar-Phu valley, and four of 26 people asked in my survey were from this place (all the respondents came from different households). The immigrants do not own the houses they live in and the fields they cultivate, they have to rent it from native Ngawalis who live in Kathmandu or Pokhara. One thing that struck me in Ngawal is how many more girls and women than men there are when I looked around. According to the survey (see table 5.4), it is also a bit fewer men than in Manang. Of the households asked, 21 % of the men were out of the village. But based on what I observed, it is likely to believe this number to be much higher. Particularly men between 20 and 40 year of age seemed to be short in number in Ngawal, and some of the households I was visiting consisted of only women. Informants in Ngawal also said the same; that most of the men are out of the village. This also fits with van Spengen’s observations from over 20 years ago (1987). Then the question arises if Ngawal is experiencing lack of labour. According to one informant, the Ngawalis used to cultivate mustard. Nowadays only a few do this, because they do not have a mill for pressing the mustard seeds. The mill was operated by manpower. Today there is not enough labour to operate the mill.

The pattern with decreased business opportunities internationally and increased business opportunities at home that is found in Manang is also marked in Ngawal, but to a less extent. Ngawal is off the main tourist route, and has therefore not experienced the same boom in tourist lodging as Manang. In the peak trekkers season Ngawal also get quite a lot of visits from trekkers, but far less than the villages down in the valley. There are about eight lodges in Ngawal, a couple of restaurants and tea shops. None of these have the same standard as the Manang lodges. The absence of quite wealthy entrepreneurial lodge owners in Ngawal



Pic. 2.4: Ngawal village from South East

makes a remarkable difference from Manang. According to what one informant said: “(...) the successful have left Ngawal, just women and the poor are left” (Ngawali farmer).

It was also more widespread to see children working than in Manang. The schoolteachers said that the number of students who actually showed up at school was between six to ten, but that it was supposed to be over 20. In Manang on the other hand, the number of students was approximately 130. According to the teachers in Ngawal and some informants, many parents did not see the point in sending their children to school, because the parents themselves were uneducated.

The amount of hired labour are also lower in Ngawal than in Manang, and some of the villagers in Ngawal believed that the VDC did not allow hired labour on the fields. The VDC chairman of Ngawal on the other hand denied this.





### 3 Method

How are the research questions going to be answered? This thesis has an empirical orientation, which means that the data used to answer the research questions are produced from observation, conversation and interviews. What makes this piece of text a scientific thesis and just not another travel description is its use of scientific methods. This chapter discusses different methods and their theoretical foundations, as well as how the data for the thesis were collected, and how to interpret, understand and analyse the observations gathered.

The most important source of data was the fieldwork carried out in Manang during a couple of months in the spring of 2004. The choice of methods is dependent on the research question of the thesis. With the research questions presented, it follows that the research will to a large extent be qualitative. The qualitative research focuses on the “how” and “why” side of phenomena, while quantitative methods are about variation and extent of phenomena. The choice of qualitative methods does not exclude quantitative methods. The methods supplement each other more than they compete. And as Kjeldstadlie says: “What can be counted should be counted” (in Fossåskaret 1997,12), and this is also the case for this thesis. On the other hand, due to the nature of my research questions, quantitative methods could in this thesis only serve supplementary and supportive roles; it would not give the answers. The quantitative approach requires a high number of respondents on formalised surveys, and observation which can be put in definite and mutually exclusive categories. The qualitative approach needs fewer informants, goes deeper and does not produce definite answers.

Most of the data for this thesis were collected from conversations in the field and interviews, as well as observations. All these are informal sources of data. But I also used some formal sources, namely a formalized survey, maps, reports and literature from the area.

Entering the field, the goal is obviously to get answers to the research questions. But how to ask the questions? Who to talk to? I had prepared some general interview guides and a list of people to talk to. This gave useful key information, but served as much as a starting point for developing new questions and perspectives for the overall research project. Under way I found out that some of my hypotheses and research questions might not be as relevant or interesting for writing a thesis. This meant that fieldwork was carried out in an inductive manner.

### **3.1 Qualitative methods**

How to approach the task of doing fieldwork in a mountain community situated very far away, both in physical distance and culturally? In qualitative research, the goal is to achieve new knowledge about how people understand and relate to their reality, how to explain phenomena and the “lifeworld” of the informants.

The research is focused on the relations between individuals, rather than upon the individuals themselves. The aim is to understand and explain social phenomena, and how the informants transcribe meaning to their reality. When it comes to the question of understanding meaning, qualitative methods resemble hermeneutics – the science of interpretation of meaning, and semiotics – the science of signs. Both approaches are applied in social science and humanities. A semiotic approach in social science means looking at concepts as signs that re-present objects in the worlds of the actors. The task is to uncover what they contain and what meaning they express (Aase 2004). According to Fiske (1982 (in Fuglestad & Ianke Mørkeseth 1997)), meaning is constituted in the trialectic between sign, the object and the reader. A semiotic perspective eases the understanding of the importance of the researcher’s own perception of the phenomena she is studying, and the role of the researcher in the research process. (Fuglestad & Ianke Mørkeseth 1997). The latter aspects of semiotics are perhaps the most useful ones regarding this thesis. I will come back to the issues of interpreting categories and meaning in section 3.4.

But how to observe and gather information? The most typical qualitative methods used to achieve this are observations, participation in actions, conversations and interviews with the informants.

#### **3.1.1 Interviews and conversations in the field**

In qualitative research, it is normal to distinguish between structured, semi-structured and unstructured interviews (Dunn 2000). The first one follows strictly an interview schedule, and is therefore question oriented. The semi-structured interview covers the middle ground between the structured- and the unstructured interview. The interviewer applies an interview guide, but he does not need to follow it strictly. Dunn (2000) calls this a content oriented interview. An unstructured interview is the same as conversations in the fields, and is semi-structured and informant oriented. The questions asked depend partly on the answers from the informants (ibid). Conversations in the field is like the “the ordinary talk between people”, and the researcher may tell as much as he is listening (Fossaskåret 1997).

During the fieldwork in Manang and Ngawal, various degrees of unstructured interviews and conversation in the field were the methods I used most frequently. It counts for the majority of the data from my fieldwork. For instance, I walked to look at a glacier, a four-hour walk above the village along with one local man I had made friends with. Under such a trip, we talked a lot about many things, and often topics related to my research questions. There is a continuum between the method of conversations in the field and participant observation that I will describe in the following section.

### **3.1.2 Participant observation**

To do participant observation is often a desired goal of the qualitative researcher. But what does it imply? Often the participant observation ends up being just observation. By doing real participant observation, the researcher tries to become one of those he is going to study. The aim is to get “backstage” in the field (Aase 1997, Goffman 1959). To get backstage means getting access to honest opinions, beliefs and arenas of interaction. Whether or not it is possible to do this depends on which status the researcher gets in the community he is working. The status given to the researcher depends on the researcher’s behaviour. Participant observation is all about getting the right status, Aase argues (1997). By participating in the same activities as the informants, it is more likely that the researcher will be treated less as a stranger and more like “one of us”, and thus be trusted with more information.

In the fieldwork carried out for this thesis, the aim was to study how the people in the two villages were able to sustain their water supply under a situation marked by contextual changes and events. In order to obtain as good knowledge as possible about the local conditions, to get backstage, it was necessary to get to know people in the village as early as possible. Just four days after arriving in Manang, an opportunity arrived. It was maintenance day for one of the canals. I was able to join, and I describe in the next chapter how it turned out.

### **3.1.3 Doing participant observation – digging canals**

The maintenance days provided just the right opportunity I was looking for to do the long-desired participant observation. The first day I just visited the place where people were working, together with a local who was going to show me the irrigation canals of the village. I made some question, and my guide and interpreter asked the workers for me. The next day I went to the canal workers lunch together with a local I had learned to know. He also asked the canal workers some questions for me. The third day I joined in order to work. It was after the



Pic. 3.1: Manangi farmers working on the Mon Kyur II canal on the maintenance day.

suggestion of the person I had been with the day before. I went to the work site alone, asked the committee leader if I could join, and he welcomed me to do so. On the way to the site I could see people walking to the meeting point carrying small hoes, picks and shovels. One was carrying a drum. At the meeting point, the starting point of the canal, the committee leader and another man divided the canal in pieces of approximately ten meters by using a piece of rope. All the workers, between 20 and 30 in total, were then divided in groups of five to six members which were supposed to finish one piece of the canal at the time. This way of organizing the work was supposed to make less workers standing idle on the side watching. One woman who arrived 30 minutes too late had brought a bottle of *ara*, the local booze. This was accepted, and she did not have to pay a fine.

People showed a positive attitude to my attendance. Some tried to make a conversation with me with their few phrases they knew of English, and a few were laughing and pointing at me. But mostly, people did not seem to care much about my attendance. My impression was that all the workers were native Manangis, and no workers from outside the district. People seemed to know how the work should be done; it was not very complicated, mostly about cleansing the canal for pebbles and dirt. But some were always thoroughly watching the depths, so that the water could flow down without over-flow. The work was finished within lunchtime. Then we went to the home of one of the committee-women, who had prepared rice and a soup of local spinach and potatoes. This was eaten together with *ara* and *shying* (local beer). During the lunch I tried to chat with those next to me, as much with the hands and

mimics as words. This was participant observation, but did it get me backstage with the villagers?

### **3.1.4 Just another tourist or something else – Roles and statuses and the question of getting backstage.**

The aim of doing participant observation was to try to establish a relation to the Manangis that would allow me to get access to observations and information that I needed for my research. I wanted to get myself a status that would allow for that. According to Aase, a *status* allows a range of different *roles* (Aase 1997). Within the status that is given, a person ought to act in accordance with the role expectations connected to that status. As a researcher in a strange culture, it might often be a challenge to find appropriate status for the role as researcher. The task is to get a status that gives access to arenas relevant for the research. If the status given does not do that, the researcher should try to change the status (Aase 1997). By acting in opposition to the assigned role expectations of the status, the people the researcher are studying might be forced to give him a new status, Aase argues (1997).

How did my status and role develop in Manang? After the canal digging, I knew more people in the village, and if I wanted to ask some questions, it was easier because they knew me. I also talked with those who spoke a little English during the work. On the other hand did I not believe that it made a very big difference, that it really changed my status. I had not really learnt to know more people than those two who spoke a little English, and I had not learned many new things of interest for my studies. Then after staying in Manang for one more month, I talked about my participation in the canal digging with a young man of the village whom at that time I had made friends with. He said that my attendance to the maintenance day had made some fuzz in the village. Everybody had just learned about this tourist who worked at the canal, and they could just not understand why I bothered. This kind of action was not expected from tourists. Tourists did normally just stay in Manang for two or three days, I spent seven weeks in Manang. And tourists were not expected to dig canals. So what was my status? At the end of my stay, I asked a couple of the villagers I had started to look at as friends, and according to what they told me, I was a *filing*, which means “white stranger” in Nyesheng. When people were talking about me, I was referred to as *filing*. And I was a *filing* during my entire stay, according to what my friends told me. But, I had become something more, they said, more precisely a “*filing* who did research”. And to those I knew well I was also a friend, they stressed. The action itself, the canal digging, did not put me backstage at once. It was an act that did not fit in the role expectation of a tourist, a *filing*. But

it was a part of making the villagers aware of my presence, and it eased the task of making conversations, which ended up being my most important method. This was possible due to the large number of people who spoke reasonably good English in the village. So within the status as a *filing researcher* I both played the roles of friend, customer, guest and researcher.

### **3.1.5 Staying in Ngawal – A lone stranger with no one to talk to**

What about my status in Ngawal, the other village I visited? I spent a considerably less amount of time in Ngawal than in Manang, because I knew what to ask and look for based on my experiences in Manang. I did not have any big hopes of getting “backstage” in Ngawal, because there were very few people there who spoke English, and I did not have the opportunity to stay there for a long time. Anyway, I spent a lot of time in a teashop in this village belonging to a man that spoke English well. My status in Ngawal was also as *filing*. But due to the questions I asked, a rumor was spread, my interpreters told me, that I was working for some kind of donor organisation that was going to build a lot of water pipelines for the village. This probably influenced how I was treated and how people responded to my questions. More of these events are described in the section 3.3.2

## **3.2 Quantitative methods**

In qualitative research, the goal is to achieve new knowledge about how people understand and relate to their reality. This means mapping and measuring the extent and variation of phenomena and things.

In this thesis, the quantitative methods start with mapping the extent and range of the water system in the Manang and Ngawal village. This I did myself on foot, often with a local guide. I tried to estimate how important the supply to the channels is from glacier streams, and tried to get an impression of the recent development of the actual glaciers. This I did by comparing maps with my observations.

I also made a formalized survey, with definite answer categories. With the data from this I was able to make some simple statistical analysis. The number of respondents is on the limit of what is necessary to be used as a basis for statistics, but on the other hand the selection of respondents make up a large proportion of the population they are representing.

The survey also served as an entry into the homes of the village people, and legitimised my status as a researcher. Through carrying out the survey, I was able to do a lot

of unstructured and semi structured interviews ad hoc, where it was apparent that the informants had something to tell me.

### 3.3 Problems

No matter how much method literature read, it is not possible to be hundred percent prepared for what you meet when arriving in field. Unexpected problems as well as expected problems arise. Expected problems were those of language and interpretations.

#### 3.3.1 The question of interpretators

In Manang, most people involved in the tourism business were able to communicate in English, as well as a large proportion of the young people. This made it easy to make conversation and interviews with lodge owners and the more privileged youth who had gone to English high schools in Kathmandu. I was able to do interviews with several key informants without using an interpreter. This fact made it of course easy to stick to the English speaking people of Manang. But would that give me representative view on the different matters? Probably not. The less privileged and poor do not speak English. So doing small interviews with the average farmers required an interpreter. So I got one. He, unfortunately, did not speake as well English as the youth of the village, so I ended up using the English speaking people available at the moment.

In Ngawal, I was completely dependent on finding an interpreter as soon as possible. I was not able to get someone from Manang, but I was recommended someone in Ngawal. Unfortunately, his English was very poor. After a lot of hard gesturing and explaining, he understood my basic question. He ended up bringing a colleague at every interview, and they tended to be sitting arguing with each other about the right way to address my question, with me sitting there knowing nothing. They obviously found it nice to walk from house to house, and always being invited for some *raksi* or tea, now and then trying to translate small pieces of their conversations with the inhabitants of the houses. This process was utterly frustrating and tiresome for me. Returning to Manang village, I soon found out that I lacked some basic information, and returned with an interpreter from Manang at a couple of occasions.

Regarding the household survey that I carried out both in Manang and Ngawal, it is probably very unfortunate that I was not able to get the same interpreter doing the survey in both villages. How could I know that they would address the questions in the same way? Even though I brought a written translation of the survey questions from the interpretor in

Manang, the interpreter in Ngawal barely seemed to understand the meaning of this translation.

### **3.3.2 Student Mistaken as Wealthy Donor**

Another problem that arose in Ngawal was regarding my status. Ngawal is situated away from the main trekking route, but in the trekker season, there were a few trekkers in the village every day. By staying in Ngawal for several days, I was soon noticed. When I started to walk around asking questions about water and irrigation, it apparently spread a rumour that I was working for some kind of donor NGO that was going to give water pipelines to the village. And my interpreter tried to persuade me to say that my research was just for this purpose. I denied, and hopefully, the interpreter translated this message. Anyway, the level of complaints was a lot higher than in Ngawal, and some were also reluctant talking to us, saying “What do we get from you if we talk to you?” I could of course not give any promises of contributions to the irrigation system, and this I hoped should get me out of the donor role I had received, but it seemed to make the informants complain even more, in order to make me promise at least something.

### **3.3.3 Reluctant informants**

The ever nagging question of a researcher who bases a lot of the data collection on interviews and conversation in the fields is the reliability of the information he gets. At what point can the information be turned into data? When the researcher is faced with information that obviously seems wrong compared with information already established as facts. Does it make it necessary to question the reliability of the established knowledge? Or must the researcher accept that there are different versions to be told about the same phenomena?

In Manang there were certain issues that raised contradictory expressions from different informants. When I asked about Upper Manang’s past as an area hostile towards foreigners, some informants were not interested in doing anything other than insisting on that Nyeshengba had always been nice and hospital towards foreigners. Other informants on the other hand seemed to remember more of these events. Regarding questions about the caste system, some informants who belonged to a low cast told a complete different story than those of the higher ones. And when trying to figure out how power relations in the communities were revealed under conflict over irrigation, those who defined themselves as poor told a different story than those who by others were termed rich. Both these events displays that knowledge always is “situated” and embodied (Harraway 1991).



Expressions and answers that are given as responses to certain question raised by the researcher communicate information at different levels, whether the answers contradict each other or not. Contradictory expressions given as answers to the same question raise new questions; why do some informants obviously not want the researcher to know this or that? It clearly indicates that these informants do not want to have the researcher back-stage. Anyhow, the researcher must try to grasp the meaning of the expressions and the meta-communication that they might contain through interpretation and categorisation (Fossaskåret 1997). This is the topic of the next chapter.

### **3.4 From observations to data**

I have written that I have gathered data through my fieldwork. It would be more precise to say produced than gathered. The data does not just lie there, waiting to be collected. What the researcher gets through fieldwork is observations and expressions that must be placed in certain categories in order to be called data, argues Aase (1997). It is a process of assigning meaning to the world as it appears to us: Phenomena and objects that we observe are meaningless until we are able to categorize them (ibid). In qualitative methods, the question is often which categories to put the observations into, and to find the meaning connected to them. The categorization of a certain observation is totally dependent on the researchers interpretation. So far I have used both the terms category and concepts. They are almost synonyms, but in some cases a concept might contain several categories, like the concept Gender includes the categories Male and Female (Fossåskåret 1997). Aase compares concept and categories with variable and value. Categorisation and conceptualisation happen at different phases of the research process. First the researcher tries to read the informants expressions and actions though her own understanding. The observation gives meaning to the researcher when it is placed into certain categories. This is empirical research, and in anthropology it is called the emic phase of the research process (Rudie 1997). To do analytical research, which is the goal of this thesis, the data must be informed by theory, and then a deeper understanding of the actual social phenomena hopefully emerges. This is the etic phase of the research process (ibid).

My informants and I come from completely different cultures. This makes it important to be aware of the very likely possibility of different content of meaning in concepts and categories. I must therefore be very cautious using my own categories in order to describe the life world of people in a strange culture (Aase 1997). This fact requires a methodological

## Method

approach to understand and interpret the information I gather from conversations and observation. “Interpretation means obtaining the categories of your informants and finding out which categories they are putting their observations into” (Aase 1997, 147). The question is to understand what meaning the informants attach to their categories.

A category is a function of experienced objects, our senses, cognitive abilities and culture. The three first elements are constants that are similar to all humans, while the fourth, culture, is a variable (Aase 1997). Aase compares categories with containers, in which we place our observations. Our cognitive consciousness could therefore be compared to a matrix consisting of an infinite number of containers. To understand the content of meaning in categories used in a strange culture, I can use what Aase (1997) terms Category Analysis. This could also be called a life world analysis. The Category Analysis consists of four steps. I will present them briefly:

- 1) Find out which categories the informants have about a given topic.
- 2) Find out how a category is constituted – what is its content of meaning and what are the keywords describing it.
- 3) Find which other categories a given category is related to (the context) through cognitive mechanisms like a) Narrative, b) Theory, c) Metaphor and d) Dichotomy.
- 4) Find which category a given observation will be assigned to.

So how to apply these methods in Manang? The scientific perspectives become distant when you find yourself in the role of a researcher far away from the writing desk. Communicating through a second language adds to the challenges. How do I know that the informants and I have the same connotations to the words and terms that we use? This possible confusion comes in addition the possibility of different denotations in categories.

I tried to apply the insights from these methods during conversations and interviews. I asked the same questions to different people, and about the same topics in different ways. I asked for synonyms and explanations for the concepts I found most important, and not least the meaning in the local language and other meaning of that word in the local language. Through this strategy I hope I have obtained the content of meaning for the most important categories. I have not uncovered any larger mismatches over concepts and categories during translation. Nevertheless, the data are my interpretation of the observations made and conversations had in Manang, using my categories and concepts to describe the observations I made and the information I was given during my fieldwork.

### 3.5 How to analyse my data?

One thing is to collect data, but to analyse them in order to answer the research questions is another and equally demanding task. Ottar Brox writes that “the process of writing (...) is the fundamental life process in all social research” (Brox 1990, 132 (in Fuglestad 1997)). The quantitative research aims to provide generalizeable knowledge, while the qualitative research aims to give some transcending understanding of certain social phenomena (Fossåsskåret 1997). By categorizing the unknown, some deeper understanding of certain social phenomena hopefully emerges (ibid). These processes take place through the writing of the analysis, when the researcher is back from the field. What the researcher does is to use the observation gathered in the field to make some “statements about what can reasonably be anticipated in general” (Edmondson 1984,106 (in Fuglestad 1997)). Those statements can not aim to be representative in the statistical sense, to represent all similar or related phenomena. On the other hand, they aim to tell something more than just explain the observed phenomena (Fuglestad 1997). To make this statement on the basis of a limited number of observations is called *rhetorical induction*. By applying concepts and categories from theory to the observations, the researcher tries to make the reader see the special in the general (ibid).

I have tried to analyse the observations I made in Manang by using concepts and analytical tools from the theories outlined in the following chapters. But at the same time the experiences I had from the field has also guided my choice of theory. I have found Ostrom’s CPR framework to be fruitful for analyzing the water management in Manang and Ngawal. But to explain and aid the understanding of how the communities adapts to contextual changes and how this has influenced on the water management required a different theoretical approach. For this I chose *Local Dialectic* (Aase 1998), a method that I will explain in the theory chapter.



Pic. 3.2: Irrigation canal in Ngawal village. This canal is also used for drinking water if the drinking water taps are dry.

## 4 Theoretical perspectives

In order to draw some general knowledge from the fieldwork carried out for this thesis, empirical findings have to be informed by theory. This part presents the theories and concepts used to analyse and discuss the findings related to the research questions presented. The first chapter briefly presents the classic dichotomy of the social sciences: Methodological individualism and methodological collectivism, and continues to introduce the key concepts from Giddens structuration theory (1984) that seeks to bridge the two positions of the dichotomy. The aim with this chapter is to introduce the premises and key concepts that the following theory builds upon.

Section 4.2 presents theories of management of Common Pool Resources (CPR), with focus on E. Ostrom's framework (1990). These approaches see social phenomena as the sole outcome of the acts and intentions of individuals, and the focus is upon factors and variables that affect these acts and intentions.

Section 4.3 presents local dialectic, a method for analysis of processes of social change in communities (Aase 1998). This chapter also introduces key concepts to describe components of society by applying and criticising Giddens' structuration theory.

### 4.1 What constitutes society?

A fundamental question in the social sciences has traditionally been whether individualism or collectivism is the basic explanation principle for social phenomena. This dichotomy is represented through the perspectives of methodological individualism and methodological collectivism.

Methodological individualism is represented through the voluntaristic positions of humanistic theory, phenomenology and existentialism, as well as more functionalist perspectives such as neo-classical economics. Methodologically individualistic approaches consider social systems and society to be the sole outcome of the actions, motives and intentions of individuals following their free will. In rational choice approaches, individuals are seen as utility-maximising actors who calculate benefits and costs based on available information. Society is viewed as a "chimera", something that just apparently exists, but is not quite real (Johnston et al. 2000). Only the beliefs and actions of individuals are real. A methodologically individualistic perspective makes it also possible to take a reductionist position and decomposing all elements of society to action and intentions.

Methodological collectivism is represented through the deterministic positions of classic non-humanistic Marxist philosophy and different structuralist positions. Structural Marxism developed as an independent approach that sees society as the outcome of material conditions and Mode of Production, which determine the other spheres of society: Culture, religion and social organisation. Structuralism, originally a concept from linguistics, became important directions within philosophy and anthropology. Structuralism tries to look beneath the apparently visible features of society in order to uncover its underlying structures and logics (ibid). The structuralists see society as determined by structures, which constrains and guides the actions of individuals. The structures can therefore be seen as a causal explanation for human behaviour and organisation.

The seventies saw a rise of theories confronting both the voluntaristic and the structuralist positions. Structuralism was criticised for not allowing any room for human autonomy and action, and for having a too deterministic and totalising conception of existence. Giddens criticized the structuralist functionalism for reducing social praxis to pure mechanics of structures, ignoring the free will and creativity of the individuals (Giddens 1984). Structures do not determine action, they just influence it. Structures do therefore not have causal properties, the motives and explanations are to be found with the agents, Giddens argues (ibid).

The voluntaristic positions were on the other hand criticised for reducing society and all social phenomena to the sum of the intentional acts of individuals. Bourdieu (1977), Giddens (1984) and several other scholars tried to bridge the positions of agency and structure. These are rejecting both the voluntarism of the humanistic positions and the determinism of the structuralists positions, but try to bridge elements from both positions in a dialectic synthesis and get rid of the dichotomies. In order to do this, they provide new concepts that touch on both structures and agency. Just structures or just agency is not satisfactory explanations for social processes.

Giddens sees agency as the capabilities held by people to do things, like to think, act and speak (ibid). Structures are features and forces that guide social action, consisting of rules and resources, where resources are the powers and assets that an agent controls in interaction with others (ibid). Agency is always guided by structures and the social system it is functioning within. A key concept Giddens use in order to bridge structures and agency is “the duality of structures”. The duality of structures implies that humans are both producing structures as well as subjected to them in their actions: “According to the notion of duality of structure, the structural properties of social systems are both medium and outcome of the

practices they recursively organize” (Giddens 1984, 25). In this way, the duality of structures transcends the dichotomies of the deterministic views on structures and the voluntaristic views on agency.

The next chapter presents the CPR approach to natural resource management. This approach has its theoretical foundation in new-institutional economics and rational choice theory, and represents a methodological individualist perspective. The CPR approach seeks to determine what factors and conditions that facilitate cooperation among individuals that want to achieve collective benefits from the sustainable management of a common.

## 4.2 Theories on commons

When farmers invest labour and capital and construct an irrigation canal, they might have great difficulties preventing other non-contributing farmers from taking water from the canal, once the canal is in place. It is difficult to exclude users from the resource of an irrigation canal. A resource where it is difficult to exclude users can be termed a *common* (Ostrom 1990). Users of commons face several problems and dilemmas, which mostly are related to avoiding free-riding and overuse. This chapter presents some models for how to solve the problems of commons, as well as a framework for analysing commons.

The dilemmas of commons have drawn huge amount of interest from all branches of the social sciences since the classic “Tragedy of the Commons” was published by Garret Hardin in 1968. And the never ending puzzle about how people should manage a common without facing overuse and deterioration continues to engage mathematicians, psychologists, anthropologists, geographers and sociologists.

I will start by clarifying some important concepts, before I outline the classic models concerning use of common pool resources.

### 4.2.1 What is a common?

A common is a resource where it is difficult to exclude users. Ostrom gives the following definition: “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” (Ostrom 1990, 30). The term *common* does not imply any kind of ownership or rights. The state, an individual or a community can own a common (ibid). It is therefore necessary to make a distinction between a *common property* and a *common pool* resource. *Common*

*property* describes a human arrangement, a kind of ownership to a resource, while the term *common pool* describes resources where it is hard to exclude users (Bromley 1986 (in Ostrom 1990)). In the following I will use the term *Common Pool Resource* (CPR). People making use of a resource system are called *appropriators*, while *providers* are those who supply provisions to the resource system. Appropriators and providers may very well be the same people (Ostrom 1990). In the forthcoming analysis, I will only use the terms appropriators, because the providers involved in the CPRs of interest in this study are all appropriators.

A CPR shares many of the characteristics of a *public good*. A public good is a good where it is not possible to exclude users and where improvement is to the benefit of all users. What distinguishes a public good from a common is that an individual's use of a public good does not influence on others individuals use. A public good is not a *subtractable* resource. If the resource is subtractable, and the use of one individual influences the use of other individuals, it is a CPR. *Renewability* is also an important attribute that determines the consequences of utilisation of the resource. With non-renewable resources, the task is to find the right intensity with which to extract the resource. There are several categories of renewable resources, of which the most important ones concern the degree of subtractability. A forest is renewable, but it is subtractable, and sometimes overuse may extinguish the resource. Non-subtractable resources are typically rivers, all the water may be used, but there will still be coming more water if the use is stopped. In this way, a river could in one situation be a public good, but as soon as the use of some individuals influences on others users' utilisation of the river, it turns into a CPR (ibid).

The regulation of access to the use of the resource is also crucial for how utilisation affects the resource. An *open-access* regime means that there are no defined boundaries of the resource and no definition of users, which means unregulated and free access to the resource. Both public goods and CPRs are frequently subject to degradation and under provision due to open access. Bromley also uses the presence of regulation of the use of the resource to determine whether a resource is an open access resource or a CPR (Bromley 1986 (in Ostrom 1990)).

Water resources are in many places around the world managed as a CPR. Irrigation system as commons are characterised by being renewable, non-subtractable and that its infrastructure is often a public good. Looking at an irrigation system as a CPR, the term *resource* does not only include the water, but also the infrastructure needed to utilize the water.



#### 4.2.2 The classic models of commons

At the heart of all the problems facing appropriators of commons is the problem of free-riding. A free-rider is a person who utilizes resources from a CPR or another public good without giving anything in return. Free-riding can take many shapes. The free-rider may refuse to limit his consumption of the resource in order to make it sustainable, he may not pay the fee that is required to keep the resource available or he may not contribute to the maintenance and construction of the resource. Because of the free-rider problem, no rational, self-interested person would contribute to a public good, Mancur Olson stated in his article “The logic of Collective Action” (1965). This idea was soon known as the “zero contribution thesis”. Together with Garret Hardin’s Tragedy narrative (1968) and the Prisoners Dilemma game model (PD game), it has become the classic way to model the outcome of a CPR-situation. And these models have further been used as analytical foundations for natural resource management policies (Ostrom 1990).

Probably the single most influencing text on commons is Hardin’s “The tragedy of the Commons” (1968), which I call “the Tragedy narrative”. The article describes a situation where pastoralists have cattle on a common pasture. The pasture can sustain a given number of cattle. If the limit is surpassed, the fields will be overgrazed and the cattle will lose value. But the pastoralists will not limit their number of cattle in order to keep the grazing on a sustainable level. As long as they have no information about the intentions of the other actors, they will always let as many cattle out on the pasture as possible, because their marginal benefit from having one additional cow is greater than the marginal loss due to an overgrazed field. This is because the benefit is individual, but the loss from an over-grassed field is shared among all the farmers. This mechanism will inevitably lead to the tragedy of the common, Hardin argues. “A man locked into a system that compels him to increase his herd with no limit – in a world that is limited”, Hardin writes (1968, 1244). It will be rational for an actor not to restrain his use of a common-pool resource, because if he does, he will lose economically in comparison to those who are not restraining their use.

Interaction within groups that utilize a resource is often complicated and involves different rules and customs. Approaches from game theory have come to be a popular way to describe behavior in common situations (Ostrom 1990). A CPR-situation was typically modeled as a PD-game (see table 4.1) (Pedersen 2002). The prisoner’s dilemma describes a situation with two prisoners, isolated from each other and with no information about each other’s actions. If they both keep quiet, they are both going free. If both are talking, they both get one year in prison. If prisoner one speaks, and prisoner two keeps quiet, prisoner one gets

free with a reward, and prisoner two gets two years. The option that gives the collective optimal outcome for both will be bad for the one who follows it if the other one do not. The dominant strategy will then be for both to speak. A dominant strategy is the option that is rational to choose no matter what the other player chooses. And when both players choose their dominant strategies, the outcome is sub-optimal, the third best. This paradox, that the individual rational choice gives a collective irrational outcome, was very fascinating to scholars, and by 1975 there had been written more than 2000 papers over the subject (Ostrom 1990).

**Tabel 4.1: Prisoners dilemma game**

		Player B			
		Denies		Confess	
Player A	Denies	1	1	-2	2
	Confess	2	-2	-1	-1

The number at the left side of a cell displays player A's outcome and the number on the right side displays player B's outcome.

The Tragedy narrative can also be formalized as a game with the same structure as the PD game. That it is possible to formalize the Tragedy narrative as a game model made it a meeting point for several disciplines like institutional economics, psychology and organisation theory, and this added to its popularity and use (Pedersen 2002). There are also a variety of other games that can be used to illustrate several dilemmas of collective action.

The PD-games and other simple two-player games can be criticized for being unrealistic. There are particularly two objections that can be made. The first is that the players in the games not are communicating. If they did, they might easily agree to follow the strategy that is to the best for them both. This requires that the players trust each other. If they do not, a PD-dilemma situation easily occurs. The other objection is that the games are single-shot games. If the games were repeated, the players might base their strategies on experiences from the previous rounds. So if game modeling should be used as a tool for describing outcome of resource management situations, the games need to be more complicated, with more players, more options and more realistic preconditions than the simple PD-game. And most resource economics do model different resource management situations as games. (Ostrom 1990, 2000). But if not, the preconditions and details for the actual situation that is to

be modeled is carefully included in the game as a model, the model would be meaningless. And whether it is possible to model common situations as games at all is a different question.

The popularity of the Tragedy narrative and the other classic models made it obvious to many policy makers that natural resources should not be managed as commons. Hardin's solution was long "mutually agreed" upon coercion (Ostrom 1990). The state had to impose strict control over the use of commons, local governments, informal and non- governmental institutions were not able to develop effective ways to prevent situations that lead to tragedy. Similarly, building on the same assumption as Hardin, Demsetz (1964 (in Pedersen 2002)) and others argued that privatisation of all resources was necessary in order to sustain optimal utilization.

#### **4.2.3 Critique of the classic models**

The classic models of commons and the policies based on them, were heavily criticized by researchers with experience of CPR situations. The critics argued that Hardin confuses commons with open-access regimes (Ciriacy-Wantrup & Bishop 1975). A common is something different from an open access regime; the access to a common is under control of a group, while no one controls the access to an open-access regime. "Common property is not everyone's property", Bishop and Ciriacy-Wandrup argues (1975, 715).

Ostrom identifies the following premises the classic models are building on:

- No one communicates
- High personal discount rates
- Little or no mutual trust
- Everybody act independently

These conditions, Ostrom argues, do not characterize most small scale CPRs (Ostrom 1990, 183). Further, the models tend to assume the actors to be rational, profit maximizing individuals with complete information, and that profit could be traded into other kinds of goods on a market (Pedersen 2002). Empirical findings rather suggest that appropriators of CPRs not necessarily act to maximize their profits, but to satisfy their needs. The appropriators rarely have access to all relevant information about the CPR and the other appropriator's behavior. And in many CPR situations it might not exist markets for trading the resources extracted from the CPR (Pedersen 2002).

Ostrom (1990) argues that the Tragedy narrative is used metaphorically in policymaking. If some variables from given cases were similar to some of the variables in the Tragedy narrative, policymakers have tended to regard the actual case as in a condition of a

Tragedy of the Commons, resulting in policies based on often inadequate and limited knowledge. Then when the policy is carried out, the outcome is still not optimal, because some crucial variables were not taken into account (ibid). There are a lot of examples of this, like from the nationalization of forests in Nepal and several other third world countries. In Nepal the forest used to be village commons, then it was turned into governmental property in order to avoid deforestation. But after the nationalization of the forest, the deforestation rate just accelerated (Messerschmidt 1986 (in Ostrom 1990)).

In addition to empirical studies, game theory studies based on experiments have shown that humans in collective action situations do not necessarily act as rational players in a PD-game. Change of preconditions such as communication between the players and repetition of the game may produce completely different outcomes than a PD-game (Ostrom 1990, 2000).

#### **4.2.4 Towards a theory of CPR**

Why do some groups manage to use their commons over generations, solving challenges as they emerge, without facing degradation and tragedy, while other groups tend to overexploit and degrade their common resources?

Several scholars have attempted to make theoretical generalizations over the conditions under which groups manage to govern their commons without facing tragedy. According to Agrawal (2001) the most important of these are Balland & Plateau (1996), Ostrom (1990) and Wade (1988). The writers studying long term sustainable management of CPRs agree that the key to achieving this is the appropriators' ability to self-organise. The writers do agree that ability to self-organise is mostly dependent on how much the participants can improve their overall benefit by cooperation (Agrawal 2001; Ostrom 1990, 1994). The ability to self-organise is also dependent on the characteristics of the group of appropriators (ibid). The next sections will present and discuss these factors and variables.

The substantial amount of research on commons has ended up being regarded as an independent theoretical approach, the CPR approach (Pedersen 2002). It consists mainly of case studies or comparisons of case studies. It is cross disciplinary, but has its roots in theories of collective action and theories concerned with social dilemmas and game theory, like Olson's non-contribution thesis (1965) and Hardin's Tragedy narrative (1968). Still, few attempts have been made to construct a comprehensive theory. I will in the following chapter present what is regarded as the most thorough approach towards a coherent CPR-theory, Ellinors Ostrom book from 1990 (Agrawal 2001, Steins et al. 2000). This will also be the framework I will use when I analyse the water systems in the two villages in Upper Manang.

### **4.3 Ostrom's modell**

How collective action for sustainable management of CPRs can be possible is the topic of Elinor Ostrom's book "Governing the Commons". The book (1) provides basic concepts for descriptions of CPR; (2) identifies the main puzzles and dilemmas appropriators face when trying to self-organise for a sustainable use of a CPR; (3) identifies eight design principles for institutions for sustainable management of CPRs; and (4) provides a model that displays the factors and variables found important for facilitating collective action. The following chapters will basically present themes two, three and four, while theme one was presented in section 4.1.1

Ostrom (1990) bases her framework on a variety of case studies of commons, and analyses these with theoretical concepts from new institutional economics and game theory. She recognizes that institutional theory and collective action theory lacks the ability to explain the kind of self-organisation found in groups that are able to take collective action to achieve a collective benefit from a CPR, and her framework is an approach to address this deficiency.

It is her eight design principles that have attracted most attention in previous related research (Steins et al. 2000). Ostrom's book can be viewed as an alternative to and a critique of the classic models on collective action and commons, as it shows how local users are able to manage their common resources without external enforcement of rules and without facing tragedy. It shows how local management institutions are an alternative to privatisations or nationalisation of commons. The CPR approach to management of natural resources, where Ostrom's work still prevails as a cornerstone, has now come to be a foundation for policy making within both the FAO and the World Bank (ibid).

#### **4.3.1 The puzzles of the commons**

Despite the pessimistic outcome of the classic models describing collective action, empirical findings show that self-organizing in order to achieve collective benefits is possible. But organising for sustainable management of a CPR is a complex undertaking. The appropriators can hardly know the extent of their impact on the resource over time, how to deal with serious rule infringement or how their management rules will work in time of crisis. So Ostrom (1990) assumes that appropriators in most cases have to do a lot of learning by trial and error when organizing CPR management. The time span is therefore important, according to Ostrom. She reviews case studies of management systems that have lasted from 30-40 years to over a thousand years. Appropriators would on basis of the experiences they make have the

opportunity to find out that independent utilization of a CPR will produce a lower individual benefit than organised utilization. Besides from enough time for trial and error learning, shared norms are general premises according to Ostrom. If the appropriators have shared norms, it is also more likely that they trust each other, and that they will obey to the rule in order to not to loose reputation. But there are also many examples of unsuccessful management of CPRs, despite that the appropriators shared the same norms and that they had enough time for trial and error learning.

The ability for a user group to self-organise for collective action tasks relies on more premises than enough time and shared norms, Ostrom concludes (1990). Ostrom sees three main challenges, or puzzles as she calls it, for appropriators to successfully take collective action: (1) Supply of institutions, (2) credible commitment to rules, (3) and mutual monitoring (ibid). In order to avoid free-riding, compliance to the rules is needed. Therefore the rules must be designed in such a way that free-riding is avoided. But how to craft these rules? Rules for providing sustainable use of a resource fit the characteristics of a public good; it is to the same benefit of all the appropriators. There is no incitement for an individual to establish such rules because the cost of establish them is held by the individual alone, while the benefits from the rules are shared among all the appropriators. And if the rules are installed, how to make the appropriators comply with them? If the rules are not followed, they are worthless. Given that the appropriators have shared norms and accept penalties if caught breaking the rules, monitoring of the resource is likely to ensure commitment to the rules, according to Ostrom (1990). But how to get the appropriators to monitor each other? Monitoring is also costly for the individual, while the benefit from the monitoring is collective. So monitoring also implies a problem of collective action. Each of the puzzles consists of dilemmas nested into dilemmas. Ostrom conceptualizes this into first- and second order dilemmas. First order dilemmas are dilemmas arising from the use of the common, like the free rider problem and the problem of overuse. To solve this problem, rules, compliance to the rules and monitoring is needed. Second order problems arise when the group is going to impose these arrangements on their own use of the resource. “Without monitoring, there can be no credible commitment, without credible commitment there is no reason to propose new rules,” Ostrom states (1990, 45). Still many CPR appropriators have been able to overcome these first- and second order dilemmas. In Manang and Ngawal, the appropriators of the irrigation system also face some of these puzzles and first- and second order dilemmas. I will look at how these appear and are dealt with in section 6.1.1.

The task that Ostrom's framework aims to solve is two-fold: (1) How management institutions should be designed in order to provide long term sustainable utilization; (2) and describe what factors and variables that influences on the ability for collective action. The next two chapters present both themes in turn. Then in section 6.1 and 6.2 I will discuss these aspects in relation to the water management in Manang and Ngawal.

#### **4.3.2 Institutions, nested rules and the design principles**

This section presents Ostrom's design principles for institutions for sustainable CPR management. Ostrom gives the following definition of institutions:

*Sets of working rules that are used to determine who is eligible to make decisions in some arenas, what actions are allowed or constrained, what aggregation rules will be used, what procedures must be followed, what information must or must not be provided and what payoffs will be assigned to individuals dependent on their actions (Ostrom 1990, 51).*

Institutions evolving through collective action are not enough to ensure sustainable use of a resource, Ostrom argues (1990). The institutions need to be robust. This means that the appropriators need to be able to change the rules. In order to specify what a robust institution is, Ostrom defines it as consisting of different interconnected levels of rules: I) *Operational rules* are those at the lowest levels, which guide the everyday use of the CPR. These regard appropriation, provision, monitoring and sanctioning rules. II) Above the operational rules are the *collective rules*, which apply when making policy for the management of the CPR. These rules then indirectly affect the operational rules. III) At the highest level are the *constitutional rules*, which specify how collective choice rules should be crafted and who is authorized to craft them. Decisions on this level regard constitutional changes and governance of the management institutions. A change in a higher order rule will influence the lower order rules, directly or indirectly. In this sense, the rules are nested. Both changes in constitutional rules and collective choice rule might affect the operational rules, but not the other way around. It is also more difficult to reveal the upper-level rules than the operational rules during an analysis, Ostrom states (ibid). In Manang and Ngawal, it also was possible to identify operational rules in the irrigation management system (section 5.2.2, 5.2.3, 5.3.1 and 5.3.2), but it was more difficult to identify Ostrom's two upper layers of rules; the collective choice rules and the constitutional rules. This latter problem I found to reveal a weakness in

Ostrom's approach, more specific that its focus on purposive management institutions makes it overlook that natural resource management may happen within non-purposive institutions. This I will discuss more thoroughly in section 7.1.,

So how should the management institutions be designed in order to facilitate long-term sustainable use of a CPR? Based on her analysis of the long enduring CPR institutions, Ostrom has developed eight design principles, that are essential elements or conditions that "helps to account for the success of these institutions in sustaining the CPRs and gaining the compliance of generations after generations of resource use" (1990, 90). These are the design principles:

- 1) Clearly defined boundaries. The CPR needs boundaries, and the appropriators should be defined as a group with exclusive user rights to the CPR. This principle distinguishes a common from an open-access resource.
- 2) Congruence between appropriation and provision. Well-tailored appropriation rules that reflect the attributes of the resources, like size, resource flow and predictability of the resource. The rules must also specify what kind of provision the appropriators need to provide. And finally the rules must make the cost of provision in proportion to the benefits from appropriation.
- 3) Collective Choice arrangement. The individuals have to participate in making and modifying the operational rules, and the institutions need to change in response to changes in needs over time. When the rules are self-made, the appropriators' experiences can be used to make the rules as easy as possible to enforce. When the first two design principles are met, institutions can be supplied to a low cost. But this principle is not sufficient to ensure commitment to the rules alone; therefore monitoring and graduated sanctions are needed.
- 4) Monitoring. The individuals should monitor each other's use of the resource. By doing so, illegal appropriation will be revealed, and the appropriators will learn to trust the system. For monitoring to work and the second order problems connected to it to be solved, the cost of monitoring needs to be low. In many CPRs, monitoring could occur as a by-product of the resource use. For example when a farmer irrigates his field, he can keep an eye on the canal while he is using it.



- 5) Graduated sanctions. A crucial point for solving of commons problems is that sanctions need to be enforced by participants, not by external authorities. The sanctions need to be graduated so they match the seriousness and context of the violation, and initially small so that a minor rule violation does not have disastrous consequences for the breaker. The sanctions should act as a reminder that the use of the resource is monitored, and that rule violation will be discovered. Monitoring and graduated sanctions provide *quasivoluntary compliance* – the individuals will cooperate as long as they know that commitment to the rules is monitored, and that the other appropriators also are following the rules. This can also be called *contingent behaviour*. The appropriator will act in a certain way as long as he knows that the other appropriators act similarly.

Ostrom also finds another reason for why the initial sanctions should be small:

*If an appropriator-monitor finds an offender who normally follows the rules, but in one instance happens to face a severe problem, the experience confirms what everyone already knows: There will always be instances in which those who are basically committed to following the set of rules may succumb to strong temptation to break them (Ostrom 1990, 97).*

This kind of rule-infringement need only a modest sanction, because the other appropriators might find themselves in a similar situation on a later occasion, and would like some understanding when the time comes when they too need to break the rules. But the sanctions should be graduated too, so that appropriators do not speculate in rule infringement.

In combination aims principles one to five solve the problems of commitment to rules and monitoring in an interrelated manner.

- 6) Conflict resolution mechanisms. A forum where different interpretations of the rules can be discussed adds to the system's stability.
- 7) Minimal limitations of rights to organise. The appropriators must be allowed to design their own institutions, and the government should recognize the self-organised CPR management institutions and not impose their own.

8) Nested enterprises. (Only valid for big CPR systems) (Ostrom 1990, 90).

These are the principles that characterize successful CPRs. I will discuss to what extent the irrigation management institutions in Manang and Ngawal meet these principles in section 6.1.2.

What are the characteristics of CPRs that face failure? Knowledge about why a CPR management system does not work is also important for explaining success cases. When analysing the failed CPRs, Ostrom draws upon several case studies, uses the same analysis as she did with the successfully ones, and finds out whether or not the characteristics of the failed CPRs match the design principles. Then she tries to identify probable causes of the failures.

What she found was that of nine reviewed failure CPRs, (1) three of them had clear boundaries and membership; (2) four of them had congruent rules; (3) two of them had effective collective choice arenas; (4) four of them had monitoring; (5) three of them had graduated sanctions; (6) three of them had effective conflict resolution mechanisms; and (7) in two of them were the appropriators allowed and able to self-organise their CPR-use (Ostrom 1990). In all the success cases, all the design principles were met. Among the failure cases, the best met five of them. None of the management institutions in the failure CPRs were robust in Ostrom's terms, and were either failed or fragile in all the cases. The most important characteristics of the failure cases were the situational- and regime conditions that affected the capacity for individuals to change their institutions. The appropriators were heterogeneous, had differing interests and had poor capacity to change the management institutions.

As a critical closing remark, I will note that Ostrom has not given a thorough examination of what she means with *success* and *failure*. But from her book (1990) it is evident that a successful CPR is a CPR that has been managed in a way so that the resource is not overused and there is little problem with free-riders, and indirectly that the management rules are obeyed. The situation in a failure CPR will then be the opposite, with over-use, free-riding and non-abeyance of the management rules.

### 4.3.3 How to achieve collective action?

What makes appropriators overcome the second order problems and supply themselves with institutions for management of a CPR, ensure commitment to the rules and undertake monitoring and sanctioning? These were the questions from chapter 3.3.1. This chapter attempts to provide some answers.

Ostrom uses the concept *institutional supply* of the process of initial establishment of rules from prior and incremental changes in the established rules. The incremental changes have a much lower marginal cost than initial institutional supply. That means that if CPR appropriators have been able to establish management institutions, they are also likely to be able to change them (Ostrom 1990). With this said, it does not follow that the management institutions are robust just because they are invented by the CPR appropriators themselves.

According to Ostrom (1990), the key-variable for facilitating institutional supply is the appropriator's ability to self-organisation, or ability to undertake collective action. Still traditional collective action theory has not come up with a satisfying explanation for cooperative behaviour (Ostrom 1990, 2000). This is because the theoretical predictions based on game models with rational, self-interest actors, still tend to assume non-cooperative behavior in collective action situations. But reality tells a different story, and several authors have tried to bridge the gap, both with evidence from game experiments (referred in Ostrom 2000) and from field studies (Ostrom 1990, 1994; Balland and Plateau 1996).

The ability to self-organise for collective action is influenced by a wide range of different exogenous and endogenous factors. This chapter will discuss some of them. Ostrom finds the design principles to be a very important factor in facilitating self-organisation. If the rules presented to the appropriators are conforming to these design principles, it is likely that the appropriators will make credible commitments to the rules and undertake monitoring. According to Ostrom, appropriators are likely to commit themselves to rules that:

- define a set of appropriators who are authorized to use a CPR (design principle 1),
- relate to the specific attributes of the CPR and the community of appropriators using the CPR (design principle 2),
- are designed, at least in part, by local appropriators (design principle 3), and
- are sanctioned using graduated punishments (design principle 6)

(Ostrom 1990, 185)

If external authorities are interfering in the management or overrule the local decisions, this also seriously weakens the ability for institutional supply. This condition corresponds to design principle seven.

Ostrom views the process of agreeing on management rules as a bargaining process, where the participants process information about the outcome of the different options, and calculate expected benefits and costs (Ostrom 1994). Ostrom finds the probability of a successful outcome of a bargaining process over institutional supply to be influenced by several factors and variables. She provides a detailed model, figure 4.1, for how these factors and variables are influencing this process. The following four internal factors influence the individual choice: (1) *Internal norms*; (2) *Expected benefits*; (3) *Expected costs*; and (4) the *discount rate* in use. Further she lists not less than 23 different situational variables that each are found to influence on this factors. I will mention some of these when I discuss each internal factor later. The model shows the main factors Ostrom emphasizes in her framework, as they are the ones that directly influence on the bargaining process. But she also mentions several other factors and variables that influence on the general ability for collective action:

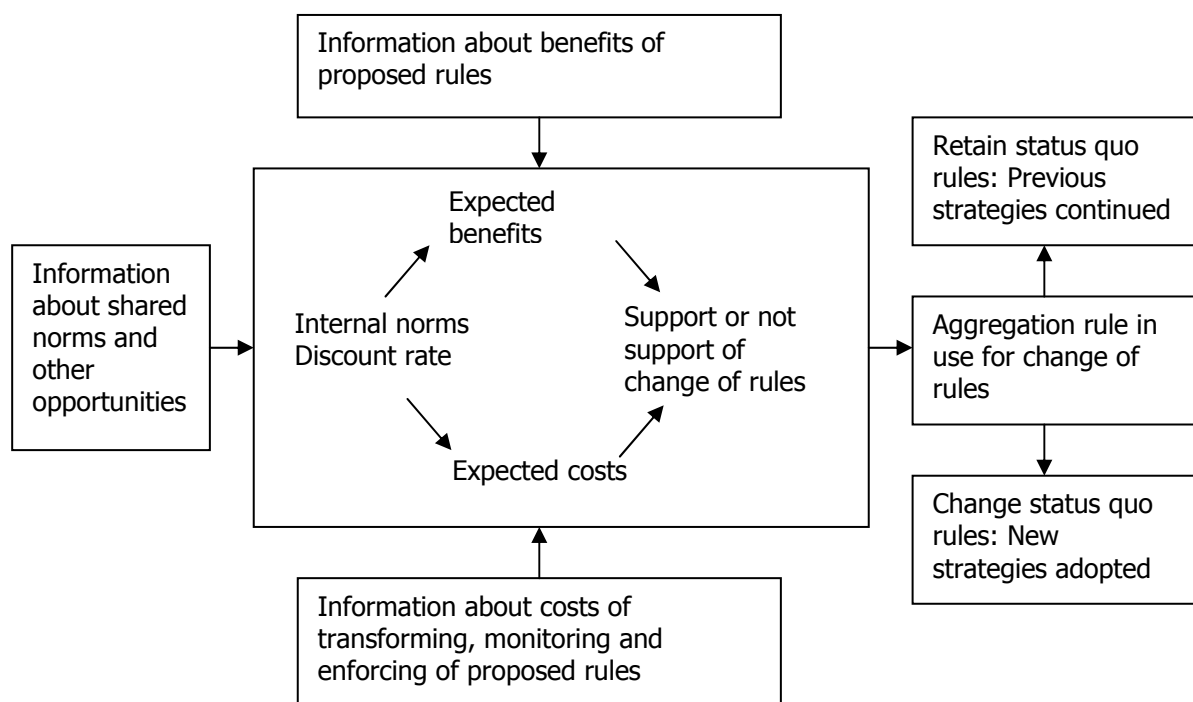


Fig. 4.1: Summary of factors and variables affecting institutional choice (Ostrom 1990, 193).

(5) The *total number* of decision makers; (6) the *heterogeneity* of the participants; (7) and the presence of participants with *substantial leadership* or other assets (Ostrom 1990, 2000).

For appropriators living together in small and homogenous communities, long-term self interest behaviour is found to produce strong shared *norms* (Ostrom 1990, Balland & Plateu 1996). This is due to their collective fate connected to the state of the resource. Shared social

norms are also likely if the appropriators perform other activities together. This is contrasted to the situation where the CPR-appropriators are not coming from the same community and do not know each other. Then social norms regarding the resource use are likely to be weak. Social norms are “shared understanding about actions that are obligatory, permitted, or forbidden” (in Ostrom 2000, 144). Shared norms provide thrust and reciprocity. Ostrom (1990) finds strong shared norms to reduce the appropriators’ discount rates. Further, strong shared norms reduce the cost associated with monitoring and sanctioning of the management rules, which also make it easier for the participators to agree upon CPR management rules.

Ostrom assumes that the participators in a CPR system are rational actors that calculate expected *benefits* and expected *costs*, based on available information, when they decide to undertake collective action. The rules presented to the participators are crucial for how they evaluate benefits and cost, Ostrom finds, and this brings in the design principles, which aim to minimize the cost of institutional supply. Ostrom lists several situational variables that might influence the benefits and costs. The number of participants and the size and structure of the CPR influence the cost of monitoring and sanctioning. The resource characteristics, like size, structure and predictability, also influence how the participants evaluate benefits.

A high *discount rate* among the participants does not facilitate collective action. The discount rate determines how many resource units the appropriator wants to extract from the CPR in order to satisfy his needs. The discount rate typically depends of the time-horizon of the appropriators. If the appropriators live close to the resource and have utilized it for generations they will have a much smaller discount rate than appropriators of a resource with no local connections and who operate on a short time span. It is also possible to see this difference as the difference between a utility *maximizing* individual and a utility *satisfying* individual.

A *small numbers* of decision makers and participants in the CPR system are in most of the cases found to facilitate collective action, but Ostrom also mentions successful cases with many participants. The importance of number of participants must therefore be investigated on a case by case basis.

Early works on commons tend to assume homogenous actors, but there are always some differences between the participants in a CPR system, Ostrom acknowledges (Ostrom 1994). Small, homogenous communities are in the most reviewed cases found to be more likely to have a successful management of CPRs, but this does not make it a rule. The level of *heterogeneity* among the participants in respect to power, endowments, ethnicity, religion, wealth and accessibility to the CPR are likely to influence the ability to undertake collective

action. What kind of heterogeneity and its implications have to be investigated case by case, Ostrom concludes.

Finally is the presence of participants with *leadership* or other assets found to be important to initiate a process of institutional supply (Ostrom 1990).

The importance of these variables vary from case to case, some are not relevant at all in some situations, while other variables not mentioned here might be crucial in other situations. In Manang and Ngawal, I have attempted to identify factors and variables that can help explain the inhabitants' ability to manage their water resources. This I will discuss in section 6.2.

But even if the community is capable of successful self-organisation, all organisations are vulnerable to threats. In a paper from 2000, Ostrom cites findings from empirical literature that lists different contextual variables found to threaten the ability to sustained collective action (referred in Ostrom 2000). These are not included in her framework from 1990. The following factors seem relevant for the cases of Manang and Ngawal: 1) Migration; 2) rapid change in technology; 3) and frequently turning to external sources of help (Ostrom 2000). All these phenomena take place in Manang and Ngawal, and in addition to the analysis of collective action in section 6.2, point 1) and 2) will be discussed separately in section 7.2.1 and 7.2.3. In-migration as well as out-migration might destabilize a CPR management regime. Out-migration may do so by the loss of those who provide necessary contribution to the resource and in-migration may yield a high number of resource users who do not share the same norms regarding the resource use as the native inhabitants (*ibid*). Rapid change in technology might alter the need of provision and the availability and regularity of the resource flow, thereby making the operational rules inappropriate. Turning to external help may render the resource users passive regarding the contribution to the resource, and keep them occupied with rent-seeking activities. Rent-seeking is a phenomenon that occurs where actors use resources to develop different strategies to extract benefits from a perceived generous state, NGO or other donors, instead of using their resources to be productive.

Ostrom bases her conclusions on a basis of game experiments and evidence from the field, and assumes self-interested rational actors that maximize utility. Still she acknowledges that individuals rarely possess exact information and that they therefore are not able to do exact calculation of benefits and costs. "Benefits and costs have to be discovered and weighted by individuals using human judgment in highly uncertain and complex situations," she states (Ostrom 1990, 210).



Pic. 4.1: Aqueduct made of wooden pipes at the start of the Teng Kyur pipe/canal. To maintain these kinds of structures is labour intensive, and requires well-functioning appropriation rules.

With the conceptualization of the CPR situation, its puzzles and dilemmas; the conceptualization of institutions as nested rules; the design principles; and finally the factors and variables that influence on the ability for collective action, Ostrom provides a framework that fruitfully can be applied for analysis of the water management in Manang and Ngawal, especially the irrigation systems. Nevertheless, the framework has been criticized for its economic, “rational man” views on human behavior, its functionalistic views on institutions, its methodological individualism and neglect of contextual factors outside the local community (Steins et al. 2000, Mehta et al. 1999, Agrawal 2001). I will discuss some of this criticism in light of the findings from the Manang Valley in chapter 6.

#### **4.4 Local dialectics**

The scope of this thesis is beyond just analysing the water management systems of two selected villages in Manang Valley. It aims to discuss how the communities are able to sustain their water supply in a context of climate change, migration and technological change, as well as how religion is influencing upon the water management. This means to study how

processes of social change in the communities take place and the role of contextual changes in these processes.

Aase (1998) suggests a method he calls *Local Dialectics* to study social change in communities. It is formulated as a methodology rather than an ontology or epistemology, which aims to display how social changes take place as a dialectical process between social organisation, social structures and meaning, over space and time.

Instead of maintaining the two analytical levels of agency and social structures as the basic components of the society, known from Giddens structuration theory (1984), Aase adds a third level – the level of meaning. According to Aase (1998), social formations are shaped in the intersection between praxis and meaning. Behaviour is what can be observed, it is the social organisation, agency or praxis. This is the first analytical level. Behaviour is constrained or enabled through social structures, which is the next level. Social structures consisting of norms and rules are created and maintained through social organisation, because people to a certain extent agree upon them. The reason why people reach consensus over the structures is because they find meaning in them. No structures will be maintained if they do not give meaning, Aase argues (ibid). People obey to structures not only because they do not want to be sanctioned by others, but also because it gives meaning to do so. This common meaning in a society is called culture, and is the third level of analysis. In addition to give meaning to structures, culture contains conceptions of “the good life” (ibid). This approach to the study of social phenomena means that the methodological individualism that was the perspective in the previous chapter is left for a perspective that acknowledges the powers of social structures and culture in addition to the acts of individuals in the shaping of social processes. I will draw on this latter perspective where I finds Ostrom’s framework to be inappropriate due to its methodological individualism. This especially regards Ostrom’s narrow focus on purposive management institutions, which I criticize in chapter 7.1.

For analytical purposes then, the society can be divided into three analytical levels: Social organisation, social structures and culture (ibid). Compared to Giddens, Aase uses a wider and less abstract concept of structure. It becomes possible to distinguish between social and physical structures. Social structures are rules, norms and institutions, while physical structures can be understood as features in the physical environment that influence human action. Instead of applying the concept of agency, Aase uses the concept social organisation when writing about human action and praxis.

The relationships between the three analytical levels are dialectic in a time-space context, which means that a meaningful social organisation in one context, meets its



counterpart in another and different context. A dialectic process takes place when a thesis that is meaningful in one particular time-space context, appears as an anti-thesis in a different time-space context. (ibid). “Social change must be understood as a dialectic interaction between praxis, structure and culture” Aase writes (1998, 84). Analytically, one level represents a thesis or an antithesis at other levels in a different time- or space context. A synthesis is a thought stage in a process of change, which in the next turn becomes a thesis, which meets a new antithesis. Using this analytical methodology, it is possible to explain and analyse patterns of changes in a society in a space-time context. In Manang and Ngawal, the migration has to a certain extent been a process of local dialectic. This I will come back to in section 7.2.3.

As Giddens describes (1984), social praxis might change the structures over time, and on the other hand, changes in the structures due to contextual changes might change social praxis. Both will over time change culture. According to Giddens, agency not only reproduces structures, but also changes them through action over time (ibid). The underlying processes that make agency change structures are poorly described. What Aase does is to describe this change as a dialectical process. When applying local dialectics in an analysis, the process studied must take place over time, only then do the changes become visible.

Structures are more durable than social organisation, so if praxis is changed, its organisational principle may be unchanged and ends up as an antithesis to the actual organisation. But social structures cannot remain meaningful if praxis changes due to contextual changes over time-space. Then the social structures change, but in such a way that it does not conflict with the cultural meaning legitimating it.

When applying local dialectics, social change and development can be viewed as dialectical processes between the three analytical levels. Studying a case, the task is to clarify on which level a change is taking place and to find out if, or in what way, it becomes an antithesis at another level.

The local dialectics approach will be applied in analysing changes in the water systems in section 7.2.3. I will also apply concepts from local dialectics when criticising Ostrom’s framework in section 7.2.



## **5 The water supply in Manang and Ngawal**

This chapter aims to give a brief description of the water supply situation in the villages of Manang and Ngawal, and cover the empirical answers to the research question. In sections on the water situation in the villages I will describe the physical water availability of the villages and to which extent the villagers rely on rainfall or irrigation, how the villagers perceive the impacts from climatic change on the water supply, as well as describing my own observations. To provide data about the impacts from climatic change on the water supply would have required records from measurements of precipitation and runoff over a long time span, and is beyond the scope of this thesis. So I have focused on how the villagers perceive the development of the climate and its effect on the water supply. The chapter also presents the management systems for the respective irrigation- and drinking water supplies and the rituals connected to water.

In this chapter the results from a household survey carried out in the two villages will also be presented.

### **5.1 Funding and construction of irrigation projects**

As a part of the HMK Government of Nepal and donor nation's effort to develop the rural areas of Nepal, a limited funding of different kinds of infrastructure development in the districts is provided. Irrigation is one of the important areas of this effort. In the Manang District, irrigation development is carried out and funded through the District Agriculture Office (DAO). Earlier, there used to be District Irrigation Office, but due to low activity in Manang, it merged with the Office in the neighbouring Lamjung District. Large scale irrigation project will still be handled by this office. In Manang, the DAO provides pipes, engineering and construction for irrigation development.

The different villages must compete for the limited resources, and when the DAO has chosen its projects, the proposals go to the Irrigation Department in Kathmandu, which decides which projects will be carried out. The sites are selected after a cost/benefit analysis. The DAO has six extension offices out in the district, with staff that visits most of the villages in the District. The staff talks with farmers, and are supposed to identify the need for irrigation projects at the different places. The VDC themselves may also send a request for an irrigation project to the DAO. The staff at the extension offices makes proposals for project

sites to the main office and then there will more site inspections with staff from the main office before the different project sites are selected.

A small scale irrigation project handled by the DAO is carried out in the following way:

- 1) Survey and extensive farmer consultants.
- 2) Identify needs.
- 3) Site selection.
- 4) Establish user group committees.
- 5) 2,5 NRS pr 500 square meter irrigated land is charged from the all the farmers. This money is refunded if the farmers contribute to the construction work.
- 7) Pipelines and tanks are constructed by the users under supervision by an official from the District Agricultur Office.

(Source: Interview with DAO officials in Chame)

The DAO funds plastic pipes and necessary accessories for them, a few sprinklers and transportation to the District capital Chame. The farmers must fund cement for the tanks as well as transportation from Chame to the construction site.

When an irrigation project is finished, the infrastructure will formally belong to the VDC. In 1992, the HMK Government of Nepal nationalized all the water resources in Nepal, and in the rural areas, the water rights was transferred to the VDCs (Dixit 2000). In Upper Manang, the de facto control over the irrigation systems has nevertheless always belonged to the users, according to the local informants.

There is no formalized cooperation between the Agriculture Office and other actors involved in irrigation construction. ACAP is also involved in some irrigation projects, and cooperation occurs on some large projects, like the Gyanchang Khola pipeline for the villages of Manang and Tenki.

The DAO might assist the user groups with repair of broken pipelines, but not if the pipeline is constructed by other organisations (like foreign NGOs and ACAP). The DAO does not train the user group in pipe joining or other types of maintenance work that might require some competence.

Only one pipeline in the study area was not built by the DAO or the previous District Irrigation Office. This is the Ghatte Khola pipeline for Manang village, and it was build by a NGO called Global Route in 1997. This organisation had Californian students working on different development projects in the area. They stopped all their activities after the massacre

of the royal family in 2000. In the spring of 2004, the pipeline was broken in a lot of places, and the farmers had chosen to cultivate buckwheat in the fields served by this canal, so they would have time to fix the pipes before the sowing. In this case, the DAO had promised to assist with repairs.

The policy regarding irrigation development that is described here is termed the Farmer Managed Irrigation System (FMIS) approach in water literature and is contrasted to Agency Managed Irrigation System (AMIS) (Banskota et al 2000). In AMIS, the users are not involved in the management. The FMIS approach is now widely promoted by the HMK Government of Nepal and by important development actors such as the World Bank (Gautam & Subedi 2000). This can be seen as the influence by the CPR approach on the mainstream development policy (Steins et al. 2000).

Drinking water facilities are provided by the District Sanitation and Drinking Water Sub-office (DSDWS). In 2004, their only project in the entire Manang District was the drinking water pipeline of the Gyanchang Khola project. The Gyanchang Khola project is described in section 5.2.1.

## **5.2 The water situation in Manang**

The Manang village is situated between two streams coming down from the glaciers below the Chulu mountains, the Syaktan Khola and Ghotte Khola (see map 5.1)). The first one has been the most important for irrigation, with irrigation canals as old as the village, according to local informants. The amount of water in both Syaktan Khola and Ghatte Khola fluctuates a lot during the year, with most water during the snowmelt in early spring and the under the monsoon in June, July and August.

Traditionally, the farmers have relied on moist soil from the snow melt, and somewhat on sporadic rainfalls, and irrigation has been used both as a supply and an option if there is little rain. If the soil is dry, and there is little or no precipitation, the amount of water in the streams that can be used for irrigation makes the difference between a failed harvest or a good one.

In 1997, a new pipeline from the river Gyanchang Khola was established, which gave a stable supply of water for irrigation for the villages of Manang and Tenki. The Gyanchang Khola is a little river situated 7 km north-west of the village, with much more water than the two streams nearby the village. This pipeline had enormous importance, according to all the



Pic 5.1: The Teng Kyur pipeline ends and the Teng Kyur canal starts (see map 5.2). Annapurna II (7937) in the background

informants I spoke to. It increased the safety and generally increased the amount of wheat that was grown in the village.

The amount of water streams in the pre-monsoon seems to be dependent on the following variables: Snow melting in the Chulu Mountains, precipitation in the period, and melt water from glacier and ground water flow (this assumption is based on own observation and conversations with local informants). According to informants, the most important factor determining the amount of water in the streams in spring time is the amount of snow that falls in the winter (December to February). But even after the establishment of the Gyanchang Khola pipeline the agriculture is heavily dependent on rainfall in April and May to sustain a normal yield. The pipelines and canals do not supply enough water to make all the villagers

## The water supply in Manang and Ngawal

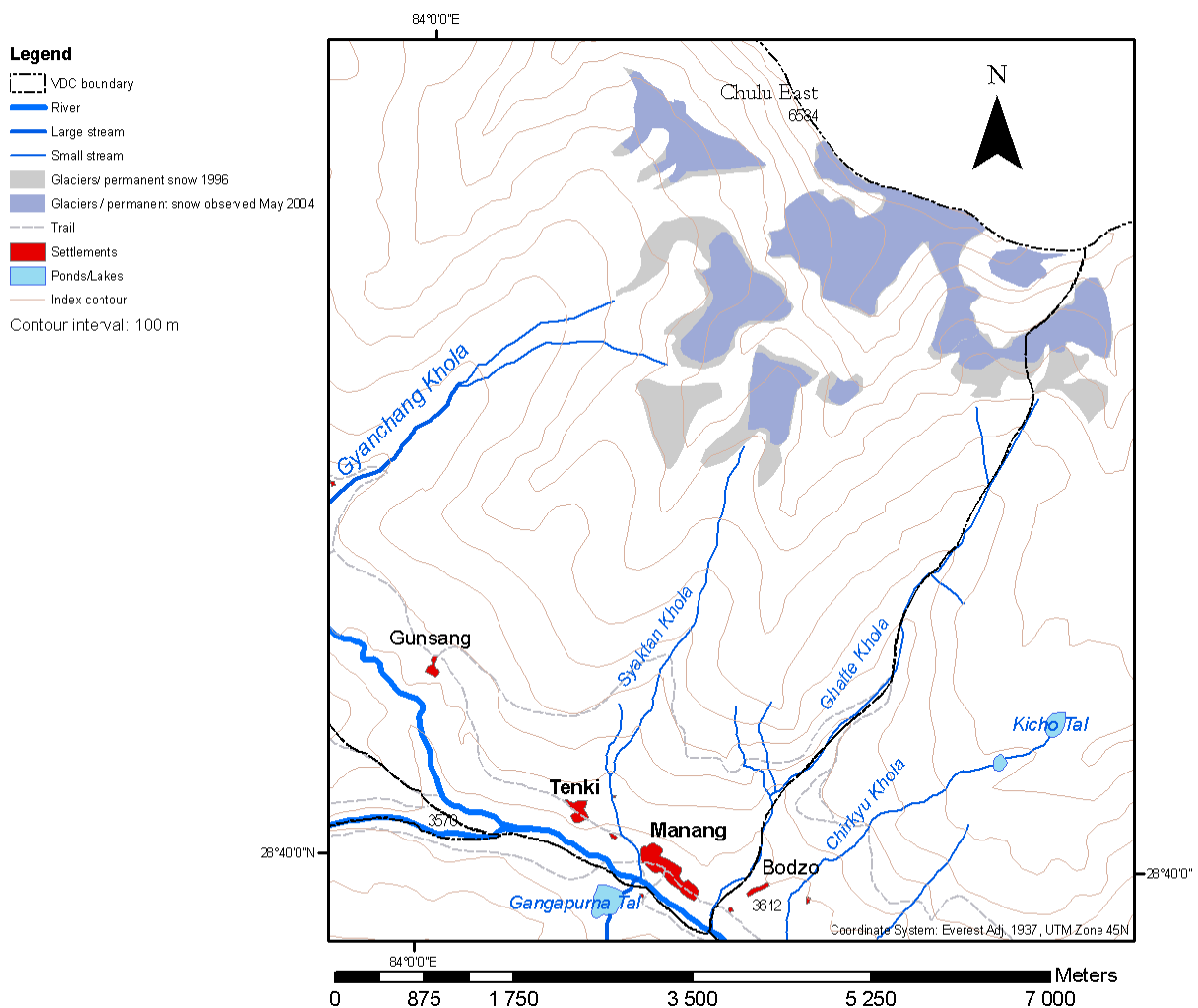
irrigate sufficiently within the same period of time if there is no rain and the soil is dry before sowing.

The importance of irrigation before sowing has increased in the past years, according to several informants. Like one of them put it:

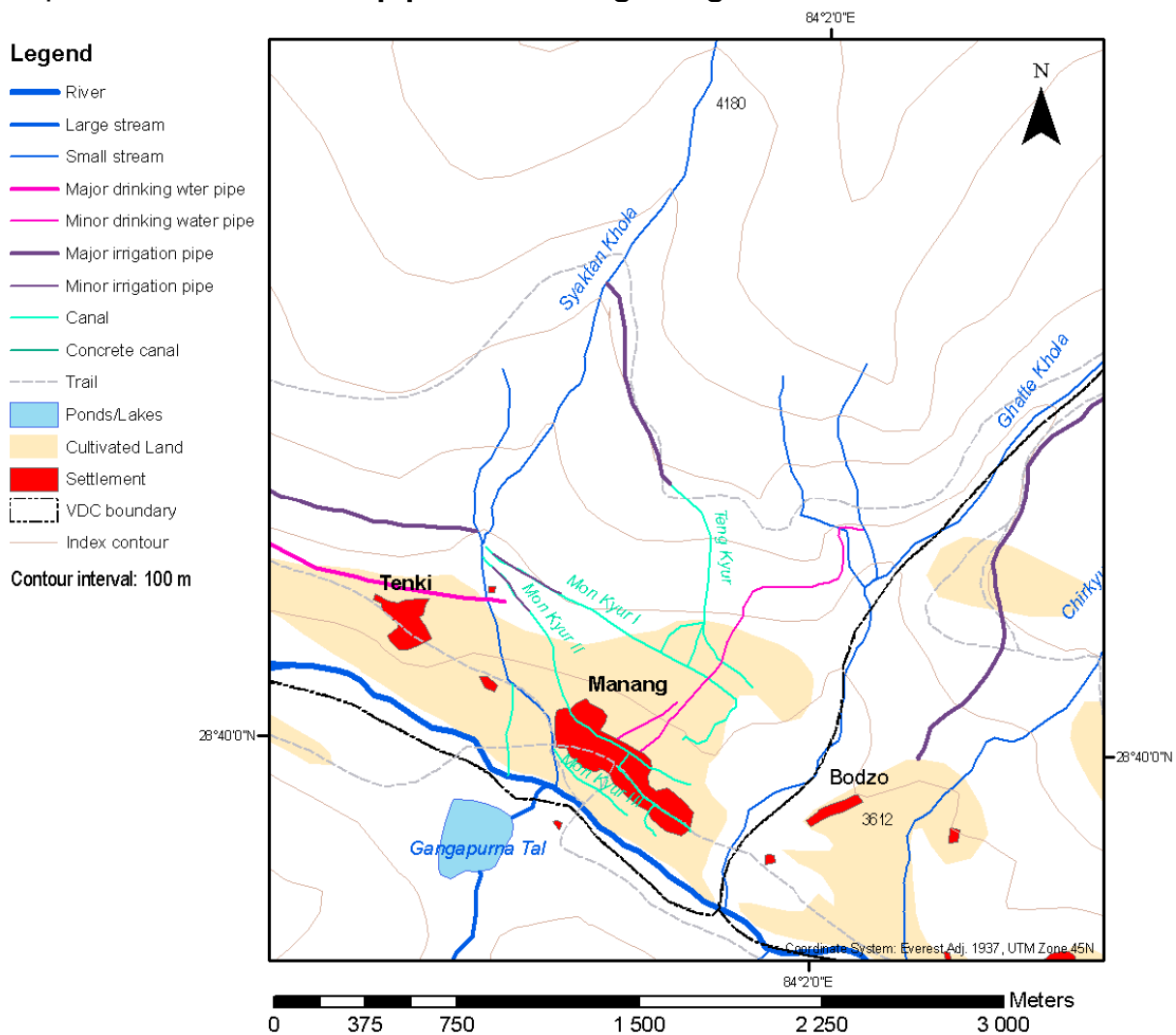
*This year it is very dry. Before it used to be much more snow in the mountains, but this year it is very little. Normally at this time it could be difficult to cross the Thorung La and Kang La pass due to all the snow. This year it is easy to cross the high passes, because there is so little snow (Manangi farmer).*

The soil was often moist enough, either from recent rainfall or due to recent snow melting in the above lying slopes. An old informant said she “could not remember so little snow in the

**Map 5.1: Estimated decrease of glaciers in Manang 1996-2004**



Map 5.2: The canals and pipes of Manang village



mountains and so little rain at this time at the year ever” (Old manangi farm woman). This informant feared a bad harvest this year due to this. Her problem was that her field was using a canal supplied by a pipe with leakages, so that they had a shortage of water in dry periods like now.

On site observation made during my fieldwork in spring 2004 compared to maps and aerial photographs from 1996 also indicates a retreat of permanent snow cover and glaciers (see map 5.1, and box 5.1). The villagers of Manang on the other hand did not perceive retreat of glaciers as a threat to their water supply. None of the informants had any opinion of the development of the glaciers feeding the streams, nor of the importance these glaciers might have for the water supply. Most shared the opinion of the informant cited (Manangi farmer), that the amount of snow in the mountains and spring precipitation were the most important factors. Some informants found the last years to be drier than it has used to be, with less water



The water supply in Manang and Ngawal

in the stream in spring time. The solution to a possible drier climate was simply more pipes, according to all the informants asked.

Manang village has four canals from Syaktan Khola, one pipeline from Ghatte Khola and one pipeline from Gyanchang Khola (map 5.2, 5.3 and table 5.1). The canals from Syaktan Khola are mostly open canals, except the Teng Kyur canal of which approximately the half consist of a pipeline. These canals and the pipeline from Ghatte Khola bring water from the streams and directly out in the fields through a network of feeder canals in between the fields. The Gyanchang Khola pipeline on the other hand leads water to the Syaktan Khola and provides a stable supply of water in the lower part of this stream (see map 5.2).

#### Box 5.1: Notes about the maps in chapter 5

Unfortunately I did not have access to aerial photographs of the area at the time I made these maps. The maps in this chapter are created with Arc Map 9.1 using shape files from a digitized Nepal 1:50 000 map (sheet 2884 05) from HMG Nepal survey department and drawings based on my own observation. This map is based on aerial photographs from 1996. The entities *Settlements, Large stream, Small stream and Glaciers / permanent snow 1996* I have digitized myself from the Nepal 1: 50 000 map. The entity *Glaciers / permanent snow observed 2004* and all *canal* and *pipe* entities I have drawn on basis of my own observations plotted onto the mentioned 1: 50 000 map with the help of GPS, compass and altimeter. The positions of these entities are therefore to be considered as indications rather than exact geographical references. The other entities in the map (*Contour lines, Roads, VDC boundaries etc.*) is digitized from the Nepal 1:50 000 map, (sheets 2884 05) by the Central Department of Geography, Tribuvan University in Kathmandu.

**Table 5.1: The irrigation canals and pipelines of Manang**

Name	Source	Type	Size	Established
Gyanchang Khola	Gyanchang Khola	Irrigation pipeline	Big	1997
Gyanchang Khola	Gyanchang Khola	Drinking water pipeline	Big	1997, finished 2004
Teng Kyur	Syaktan Khola	Half pipe, half canal	Big	Pre 1900, pipe 1998
Por Kyur	Syakthan Khola	100 m pipe, canal	Small	Pre 1900
Mon Kyur I	Syaktan Khola	100 m pipe, canal	Small	Pre 1900
Mon Kyur II	Syakthan Khola	Canal	Small	Pre 1900
Mon Kyur III	Syakthan Khola	Canal	Small	Pre 1900
Ghatte Khola	Ghatte Khola	Pipeline	Big	1997
Total length major irrigation pipes		≈ 8235 m		
Total length minor irrigation pipes		≈ 527 m		
Total length major drinking water pipes		≈ 5306 m		
Total length minor drinking water pipes		≈ 1717 m		
Total length canals		≈ 4767 m		

Under the columna "Size" does big refer to pipes with a diameter between approximately 15-25 cm, while small pipes has a diameter between approximately 10-15 cm

### 5.2.1 The Gyanchang khola project

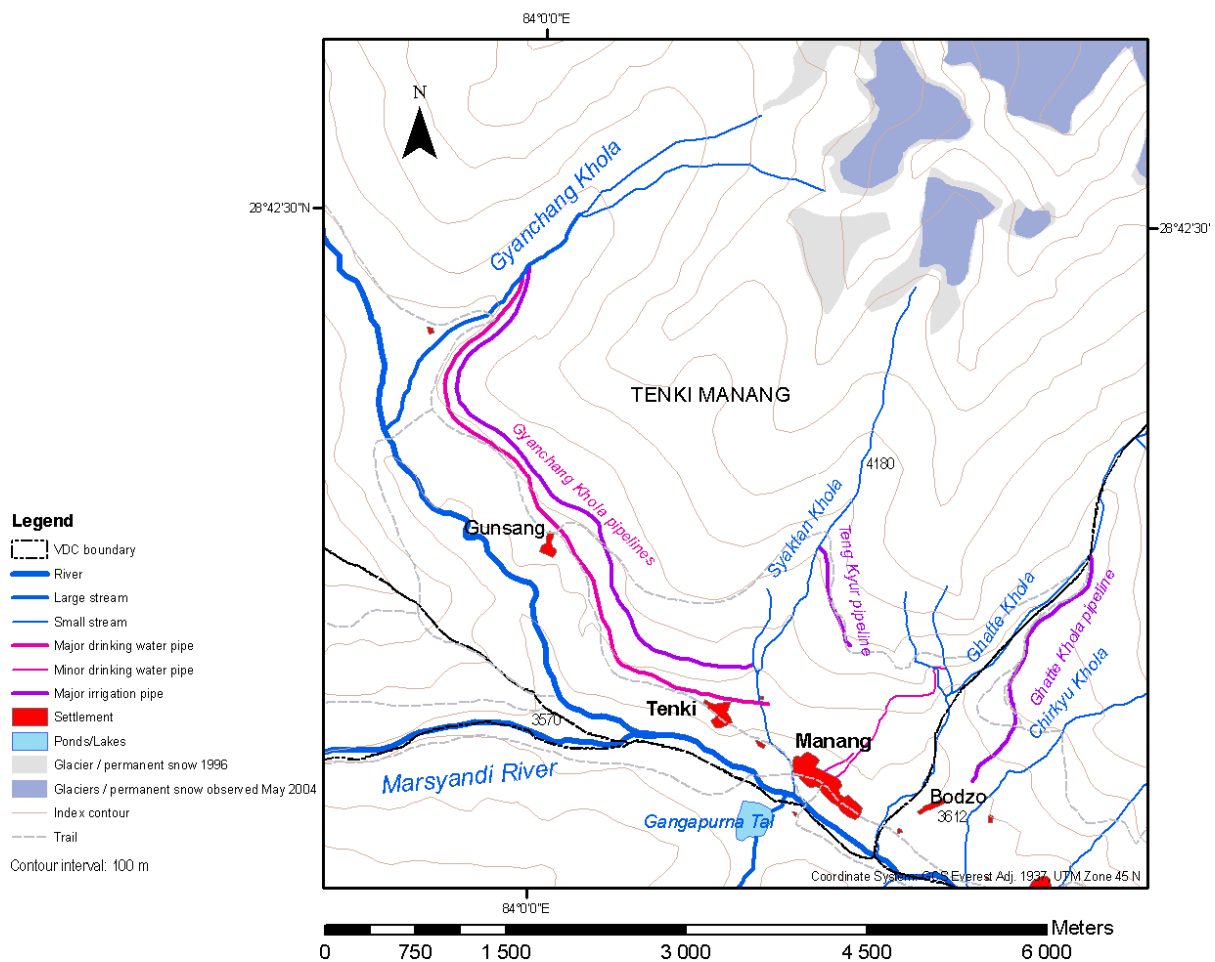
The Gyanchang Khola pipeline is the largest irrigation and drinking water project ever carried out in the Manang District. It consists of three different pipelines from the Gyanchan Khola, 6 km away from Manang (see map 5.3). One pipeline is for irrigation for Tenki village (not displayed at the map), one pipeline goes into the Syaktan Khola, which supplies several irrigation canals for Manang Village; and one pipeline, which is still not finished, provides drinking water for Manang village. The overall budget was approximately 10 million NRS. Approximately 50 percent of the cost was covered by the government, 10 percent by ACAP, four to five percent as donations from wealthy Manangis in Kathmandu, and the rest as labour contributed by the villagers. The irrigation pipelines were finished in 1997, while the drinking

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water pipeline was about to be finished in spring 2004. So how were the Manangis able to get this project through? The villagers gathered in a meeting where they established a committee to work on it, and in 1995 the VDC sent a formal request to the District Irrigation Office. The leader of the Gyanchang Khola committee was at that time also the chairman in the District Development Committee, a successful lodge-owner from Manang village. Even if the man himself did not think his position at the time was a prerequisite for the project to come through, other informants in the village were of that opinion.

*There was a lot of paper work to get it through. It was very difficult. You know, it is a lot of corruption and this sort of things. So I had to work very hard for a long time (ex District Chairman).*

Map 5.3: The pipelines of Manang village



The committee sent letters to all wealthy Manangis living in Kathmandu and Pokhara, and they received a little portion of money this way. The most important contribution from villagers of Manang was their work. All the households had to send one worker for one month of work. From Manang this meant 37 persons working for one month. The responsibility for maintaining the pipeline lies with a committee of 7-8 members elected in the village. If assistance from the DAO is needed, they will go to the VDC, which will send a formal request to the DAO.

### **5.2.2 Maintenance of the canals - provision**

The responsibility for the management of the canals and pipelines lies within several user groups and committees. The farmers who use an irrigation canal form a group responsible for maintaining this particular canal. The groups elect a committee consisting of one to four persons to lead the user group and organise different activities. The committee is appointed among the oldest farmers, and its' members change from year to year. The committee is responsible for calling one worker from each of the households that use the canal to a maintenance day, collecting fines from farmers who do not send a worker to the maintenance day, provide food to the workers on the maintenance day and to buy pipes and/or cement for repairing the pipelines from the fund collected from the fines.

The irrigation canals- and pipelines are maintained every year on a maintenance day, which is organised by the different user groups. The maintenance day of the different irrigation canals are normally held approximately 15 days before it is time to sow the wheat. If the soil is dry, it needs to be irrigated before the farmers can start the sowing. The farmers of Manang village start to sow wheat from the day the sunset hits the summit of Capsu Peak (local name, not marked on any map), west of Gangapurna. This is around the 10<sup>th</sup> of April. The sowing day may be advanced in case of rainfall, because in that case, irrigation will not be necessary in order to start the sowing. The day before the canal maintenance day, the leader of the different user groups climbs on top of some of the high roof tops in the village and shout out that it is time for maintenance, which canal and what time it starts. And then this message will be spread through the village. The maintenance follows some rules:

- 1) All the farmers who use a canal have to send one worker to the maintenance day of this canal. If a farmer uses several canals, he has to send a worker to the maintenance days for all the canals he uses.
- 2) Both men and woman can work on the canal.

- 3) No workers under the age of 16 year are allowed. Exceptions can be made for workers down to twelve years of age if they bring a good tool.
- 4) Farmers who do not send a worker and workers who arrive late will be given a fine. The fines are: 150 rupees for workers who do not show up and 75 to 50 rupees if they are late. If workers who arrive late bring a bottle of the local booze, *ara*, they might get a reduced fine or no fine at all. Apologies and gifts do also reduce the fines for other kinds of rule violation.
- 5) According to tradition, the workers get a ball of rice and some soup, and *ara* and *shying* to drink.
- 6) The user group must appoint a committee for the following year.

This way of organising the maintenance was invented by the farmers themselves they claim, even if the concept with establishing user groups for running the irrigation system is used by the DAO, as part of their FMIS policy. The maintenance rules correspond to what Ostrom (1990) term provision rules. That the Manangi irrigation users have been able to make their own provision rules makes the management system robust, according to Ostrom's design principles. The way the irrigation management system of Manang and Ngawal corresponds to Ostrom's design principles is more thoroughly examined in chapter 6.1.2.

The maintenance system has not always been as it is today. van Spengen (1987) describes an irrigation system with extensive use of canals made of hollowed out tree trunks, as well as a few aqueducts. At the time van Spengen visited the area, in 1981, each of the village households had to provide five days labour from one worker each year for canal maintenance. Landless villagers also had to contribute, and their reward for the effort was free food and drink during the maintenance days. The food and drink was contributed by the villagers who owned land. They had to contribute rice or wheat for the maintenance work in an amount that was dependent on the size of their irrigated land. It was confirmed by the villagers that they had this system earlier, 20 years ago they told me. But the villagers agreed to change it. They gave two reasons for changing the system: 1) Farmers found it frustrating to work at a canal that they did not use. 2) Introduction of plastic pipes led to less need for maintenance, so less workers were required to work at the different canals. "Before we had to go many times to maintain the canals. There was no plastic pipes, just wooden pipes", one old Manangi farmer said. This informant said that it was often difficult to get enough people to work on the maintenance days and it required also substantially more work to maintain and replace the wooden pipes that were used at that time. This was before the return-migration

had started. So at that time, labour shortage could be a problem for maintain the irrigation system. Today lack of labour was not a problem for the maintenance of the irrigation system, according to all the Manangi informants.

One informant believed that the current maintenance system made the farmers feel a stronger degree of ownership and responsibility towards the canals:

*When the farmers came back to work at the same canal year after year, they feel responsibility for this canal, and put some extra effort into doing the maintenance well, so there will be less work to do next year (Manangi farmer and lodge owner).*

A third factor that may have contributed to a change in the irrigation situation is the abandonment of fields. Until approximately 15 years ago, there was a continuous abandonment of fields, which reduced the overall need for water. “30 years ago we had to work hard to get fields. Now we have fields, but no one to work at them”, one farmer told. Migration has therefore led to higher availability of irrigation for the remaining cultivated fields, at the same time the reform of the maintenance system and the introduction of plastic pipes made it possible to sustain an extensive irrigation system with a less number of labourers. The fact that the appropriators were able to change the management system as response to contextual changes shows an ability to undertake institutional supply, which again confirms that the management institutions are robust, according to Ostrom (1990).

The plastic pipes do also need maintenance. The pipes are lying on top of the surface or just barely buried down. They are therefore prone to damages from landslides, frost heave and spring thaw. Pipes normally break in the joints between the pipe-elements. To rejoin pipes and seal cracks, some simple equipment and skills are needed. The maintenance of the pipes does not require the joint effort of the entire user group, as the maintenance days, but skilled effort from a couple of workers. In Manang, some of the appropriators have received training in pipe maintenance, and they get paid for doing small maintenance on the different pipes. Larger damages on the pipes the villagers are not able to fix themselves, and the pipeline ends up being dry until the DAO provides funding for repair. Reduced capacity of the pipelines due to damages was perceived as a problem among many Manangis. The Ghatte Khola pipeline was dry due to extensive damages. Farmers using the Teng Kyur canal were complaining about a leakage in this canal and that nothing was done about it. These farmers said that they had problems getting enough water for irrigation because of this leakage. Also the capacity of the Gyanchang Khola pipeline was reduced due to a leakage, which annoyed

several of the farmers, since there was currently a water shortage. They were dissatisfied with the current management system because of this leakage, and placed the responsibility on the VDC.

Introduction of new technology to the water system, such as plastic pipes, could be a challenge to the sustainability of the water management system, according to several authors (Agrawal & Narain 1997, Banskota et al. 2000, Ostrom 2000). These challenges regard the availability of the resource itself and to the management. The problems with leakage from the pipes in Manang could represent such a challenge. These concerns are discussed in chapter 7.2.1.

### **5.2.3 Water sharing - appropriation**

There is never enough water in the irrigation canals for all the farmers to irrigate simultaneously. The appropriation of water for irrigation therefore follows some rules, defined by the appropriators themselves:

- 1) Everyone who has a field has a right to use the irrigation canals.
- 2) If there is only enough water in the stream to serve one canal at the time, the uppermost canals serves first.
- 3) The succession of turns to irrigate the fields is decided in a lottery:
  - a) Every user group divided into groups of 5-6 farms, which fields are situated close to each other. The members of the groups may irrigate simultaneously.
  - b) Then the group draws lots to decide the succession of groups to irrigate.
  - c) The farmers may irrigate until the fields are completed.
- 4) In dry periods in the critical time around the sowing and germination, it might be necessary to irrigate more frequently. When all the groups have done their irrigation by turn, it is the first come first serve principle that applies for appropriators who want to irrigate more.
- 5) Appropriators who irrigate without it being their turn will be fined by the VDC. The fines range from 200 to 500 rupees.

The water sharing rules correspond to what Ostrom (1990) calls appropriation rules. According to Ostrom's second design principle, the appropriation rules and the provision rules must correspond to each other and the nature of the resource for the management system to be sustainable. This is discussed in section 6.1.2.

Most of the canals are coming from the Syaktan Khola. And the second rule is relevant for the three lower canals from this stream. Besides the canals to the Manang fields, Tenki village also has three canals from the Syaktan Khola. The uppermost serve first rule (the second rule) applies for the Tenki canals as well.

The Gyanchan Khola pipeline leads water into the Syaktan Khola. The establishment of this pipeline gave a significantly higher degree of predictability and a more stable water supply for the Tenki and Manang farmers. But even with this pipeline, there was little water in the Syaktan Khola during spring of 2004. This meant that only a limited number of fields could be irrigated at the same time, and that the farmers had to irrigate 24 hour a day for a limited period.

In dry periods like this, water stealing occurs. Water theft is what happens when a farmer takes water upstream of a farmer who is irrigating, outside his turn. If the one who has the right to irrigate finds the thief, they will argue and sometimes fight, according to the informants. Disputes and fighting also occur when several farmers are irrigating from the same canal, and the lower one finds that the upper one takes too much water. One informant told me that there was so little water that people had started stealing water from each other. “When it is little water, the uppermost irrigators takes it all. Fighting sometimes take place in the morning when the users of the lower canals wants water” (old Manangi farm woman).

Another informant said that when they were irrigating they used to have one worker hiding higher up along the canal to spot possible water thieves.

*If someone diverts water above us without turn, our worker who hides would go and close the opening where the thief leads water to his field (...), and perhaps confront the thief.(...) If it happens several times, we might report to the VDC (Manangi farm woman).*

This informant said it rarely happened that water theft was reported to the VDC. Most of the time there would be an argument, and sometimes a fight. But a fight did not necessarily mean that the case would be reported to the VDC. But if the offended felt that the thief did not show respect, the case might be reported to the VDC, and the offender would probably be fined, according to the informant.

The informants asked said that the current situation with water shortage was not normal after the establishment of Gyanchang Khola pipeline. They said it rarely happens that



the farmers will have to irrigate during the night, and the conflict level is much lower now than it used to be. As one of them said:

*Now we can sleep at night. But before the Gyanchang Khola there was no sleep. We used to make a fire and have torches, and we got very tired. Now we can get up five – six in the morning and go to sleep by seven – eight in the evening (Manangi farmer and lodge owner)*

Several informants talked of frequent and serious fighting in dry periods before the Gyanchang Khola pipeline where installed. Sometimes people used knives, but no one was ever killed according to the informants. The fighting over water that sometimes occurred did not produce any bad relationships between the villagers. As one of them put it: “If they fight in the night, they have forgotten it the next day” (Manangi farmer and lodge owner).

Irrigation is primarily done by women, and the improvement of the irrigation system mostly eases the labour burden of the women in the village.

#### **5.2.4 Drinking water**

In the village there are many water taps, most of them installed seven years ago by a governmental, UNICEF sponsored, safe drinking water project. Before that, the village only had one tap, according to local informants. Lack of drinking water does not occur, but sometimes some pipes freeze over in winter. Most of the vegetables are irrigated with sprinklers where the water is taken from taps. In dry periods the sprinkler irrigation might lead to some empty taps. In the peak trekker season the hotels also find the water situation marginal. There are two sources for drinking water. When the drinking water pipeline from Gyanchang Khola is finished, it will improve the water supply especially for the hotels. Individual houses might also get running water installed.

The maintenance of the drinking water system is different from that of the irrigation system. There is one technician employed by the District Sanitation and Drinking Water Sub-office (DSDWS) in the village, responsible for repairing taps and pipes. No collective action from the appropriators is therefore needed. Nevertheless, the lodge-owners are very dependent on a reliable water supply in the tourist season, and they therefore also take a high degree of responsibility for keeping the drinking water system running. The investment in drinking water and the maintenance system in Manang is apparently a result of successful lobbying of the lodge-owners towards the DSDWS.

Besides the taps, a New Zealand Aid consultant group has installed a safe drinking water plant in the village that is targeting the trekkers. The plant is officially hosted by ACAP, and run by the ACAP initiated Mother Group in the village. All maintenance and funding are still provided by the New Zealanders, as long as ACAP is not capable of doing this.

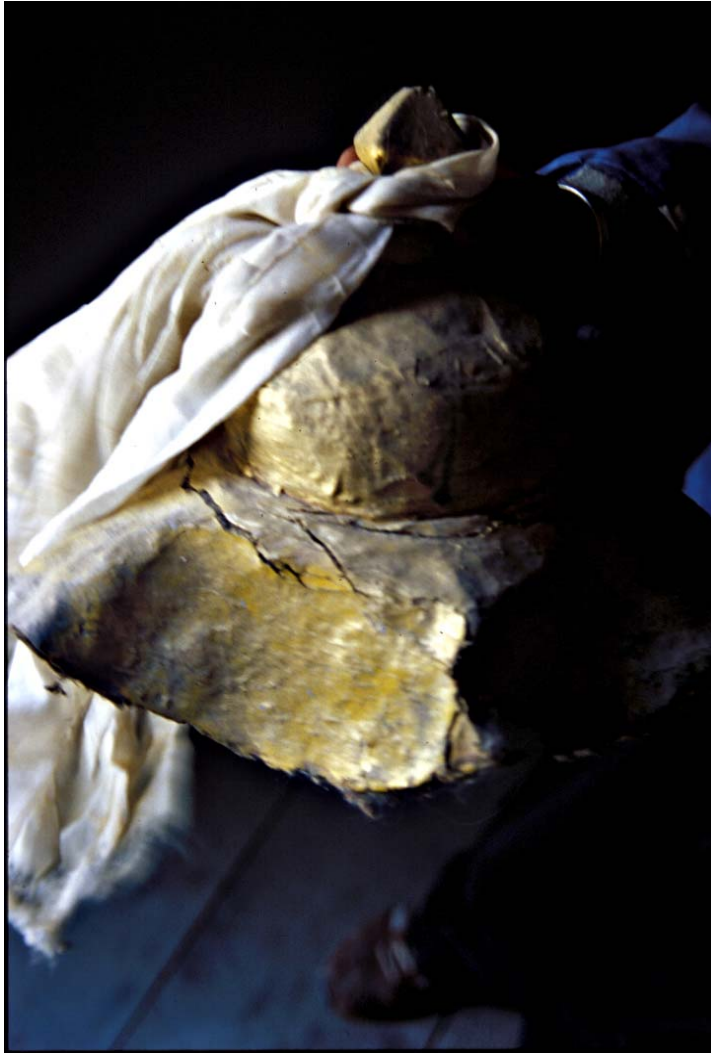
### 5.2.5 Water and rituals

With the village so dependent on rainfall, it is not to wonder that rituals related to water used to be widespread. In Manang, the most important ritual still in use is an annually *puja* dedicated to water, in late March, a couple of weeks before it is time to sow the wheat. Under this *puja* all the villagers gather at the Bodzo Gompa, they pray and give sacrifices to the god Bodzo Kaebe. Bodzo Kaebe is a local god, which 300- 400 years ago was a king who ruled the region. He had magical powers, and was able to make rain.

The rituals practiced in the *gompas* of Manang follow the Tibetan calendar *Loopon Karma Tetdung*. If there is no rain during a period of days described in this calendar, the lama will perform a ritual in order to make it rain. This *puja* should be performed at a sacred place related to water. In Manang this was the sacred lake of Kicho, situated at 4600 m a.s.l in the hillside above the village. The *puja* consists of prayers and the spraying of milk over the lake. An informant told the story about why the Kicho lake is sacred:

*Long time ago, the lama of Karken Gompa (a gompa right outside Manang village) went to the Kicho Lake. He went up to the lake early a clear and quiet morning. Just at sunrise, he saw chortens (little, square shaped pillars of stones) and statues in the lake. The lama then went into the lake. There he found a book and a statue. He tried to carry both things out, but could only get the statue. He took the statue and placed it in the Bragha Gompa. But unfortunately, the statue was stolen, and has never been seen again (Manangi farmer and lodge owner).*

People in Manang strongly believe that if you are a good person, you could walk to the Kicho lake in the early morning before sunset and the sky is clear, you must be calm and have a good heart, and then you might see things in the lake. People say that they see *chortens* and buildings. One informant told me that he had seen a forest with a path. These myths and the personal experiences kept Kicho Lake as a sacred place for the villagers of Manang.



Pic. 5.2: The hat of Bodzo Kaeba, believed to be over 300 years old.

A third ritual used if there were little water in the streams was that the Lama used to go to Syakthan Khola or Ghotte Khola and give a *puja*, which was to read from the Tibetan book and sacrifice a *tormo*, a little bird figurine made of yak butter and wheat flavour. Earlier, this used to be a real bird, but now the villagers of Manang claim to have left the practices of Black Bon, and a sacrifice of a bird would be counter to Buddhism. Anyway, currently there are no lamas who have the skill to make more water in the stream by this ritual. The lama of the Bodzo Gompa told that they also might perform some *puja* for water to *chortens*, but this is rarely done. The *pujas* given to streams or lakes was dedicated to the water itself, not to any god, according to the village lama.

People also pray individually to the god Loo for water. Loo is the snake god and live under the earth, and is the god of the domestic matters. Loo will for instance become angry if a house is not kept clean. People in Manang strongly believe in Loo, which is a god both in

Hinduism and in Tibetan Buddhism. In all the houses of Manang there a little figure of Loo that people worship.

People say that after the establishments of the Gyanchang Khola pipeline, the importance of the rituals have decreased. Before the Gyanchang Khola was established, one of the village lamas said, if there was little water, the lama used to sacrifice a bird-figure made of *tsampa* flavour and yak butter to the Syaktan Khola. This was done if there was no rain within a particular period described the Tibetan Calendar. One old farm woman said that it always comes rain and more water in the stream when this *puja* was performed.

The only ritual that is still used is the Bojo Kaeba Puja and peoples individual prayer to Loo.

Religion and rituals also play a more indirect role for the water management. There are regularly different religious festivals, some more important than others. At the most important one, most people would like to go. Then they must finish as much farm-work as possible before the festival start. This means that before a religious festival, there could be shortage of water for irrigation, because all the farmers wanted to irrigate at the same time.

The relationship between religion and the water management is more thoroughly discussed in chapter 7.3.

### 5.3 The water situation in Ngawal

Like Manang, Ngawal is also situated between two streams, Cheta Khola and Tonje Khola (see map 5.4), which are the sources of water for irrigation and drinking water. The water level in both streams fluctuates during the year, as response to snowmelt and precipitation. When I was there, the villagers said that the water level was very low.

From the Cheta Khola there are four irrigation canals (see map 5.5 and table 5.2), no plastic pipes are installed, but there are some concrete canals and wooden pipes. One canal is totally abandoned. From Tonje Khola there are three canals. All the canals were supposed to be several hundred years old, no one seemed to know exactly how old. Tonje Khola also has a little reservoir, build 60-70 years ago.

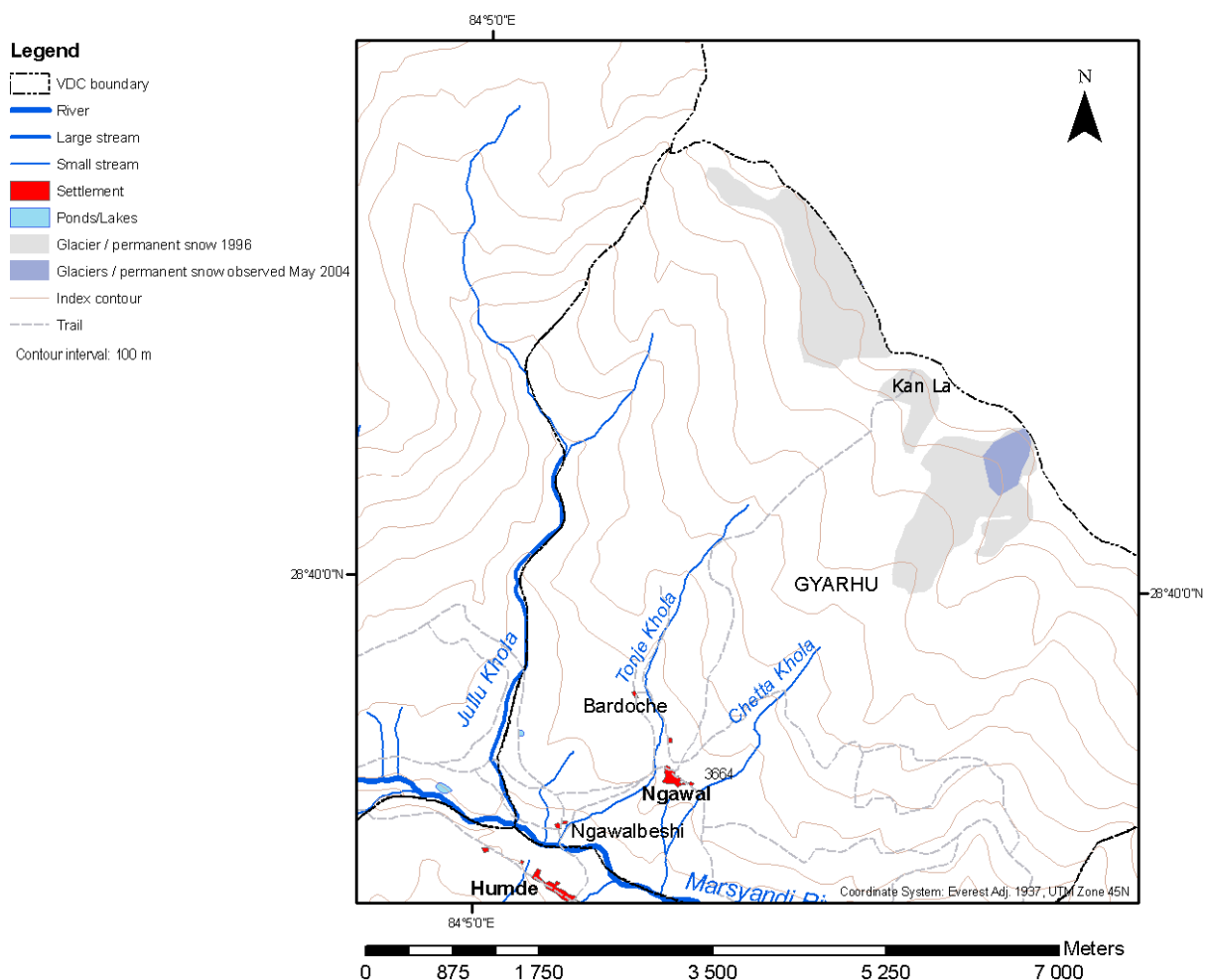
Several informants in Ngawal claimed that many of the villagers were poor mainly because of the lack of water: “People get poor because they have these poor, unirrigated fields” (Ngawali farmer, immigrated from Phu). Little or no irrigation to the field results in poor harvests if there is little rain. The same informants also said that some people would sometimes experience lack of food during the winter if there was little rain during the

## The water supply in Manang and Ngawal

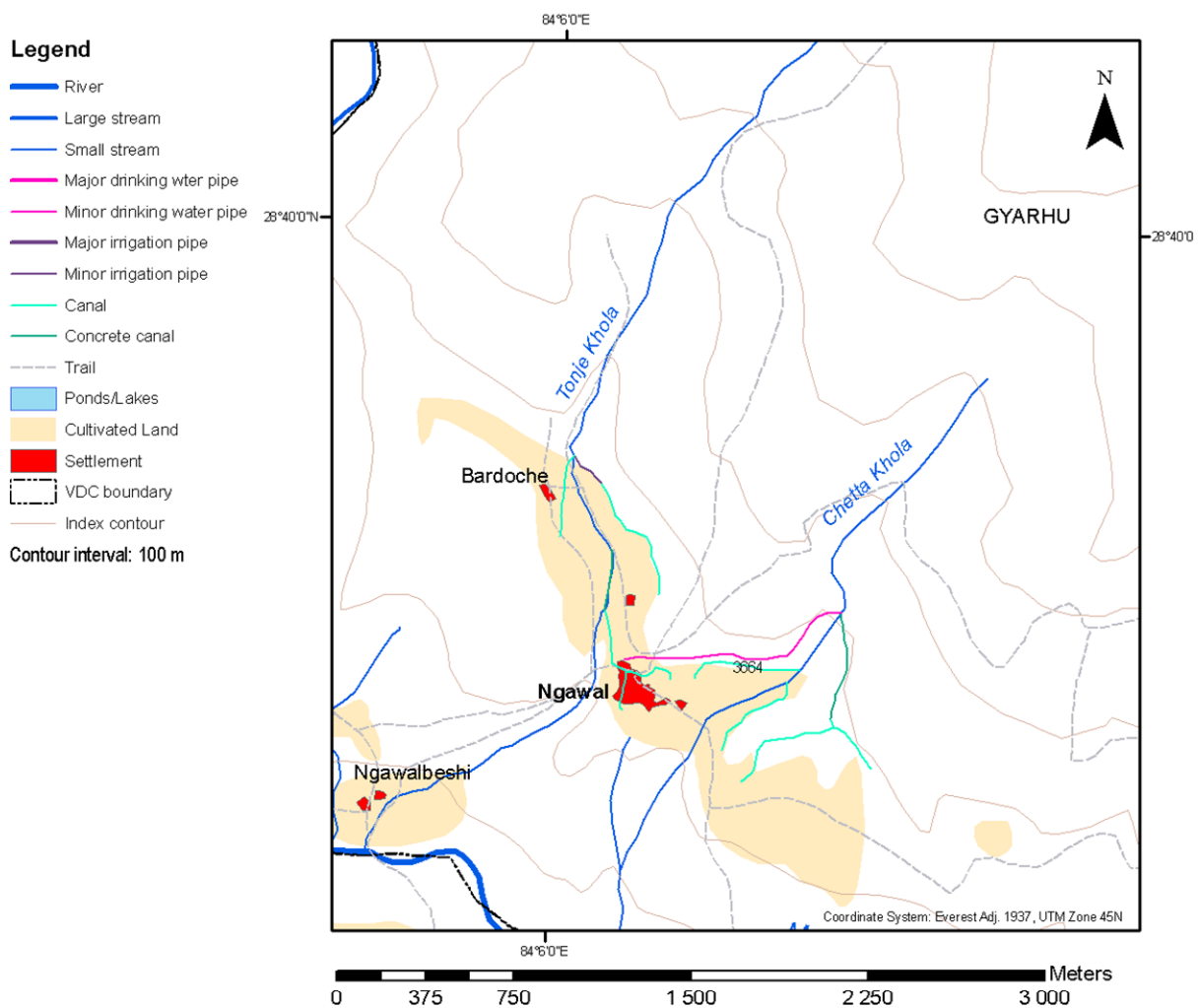
summer. Based on what the informants told, the water situation in Ngawal seems to be much more unstable than in Manang. “The main problem here in Ngawal is lack of water”, one farmer said. “The irrigation is not sufficient. Every year there is the same problem” another complained. When I visited Ngawal in the end of April, the share of fields that had been sown was much lower than in Manang. Due to the lack of rain, the wheat could not be sown before the field was irrigated. And because of little water, it took a long time for all the farmers to irrigate their wheat plot. According to one informant, several of the fields had been abandoned due to lack of irrigation: “This year and last year, 18 plots have been abandoned due to lack of water” (ex-VDC chairman of Ngawal).

As in Manang, the informants I spoke to had not thought of glaciers as important for their water supply, but when I asked, some could believe that glacier retreat might influence on the water supply. Nearly all of the permanent snow and glaciers marked on the Nepal 1: 50 000 map made from aerial photographs from 1996 had all disappeared when I was in Ngawal

**Map 5.4: Estimated decrease of glaciers in Ngawal 1996-2004**



Map 5.5: Canals and pipes of Ngawal



in April 2004 (see map 5.4). Several informants found that the environment had become drier. “Every year there is problem with water, but this year it is worse. (...) There are more and more problems, every year the streams get smaller” (Old Ngawali farmer). And as in Manang, one informant commented on how easy it was to cross the Kang La pass these days, compared to earlier years were there used to be a lot of snow. The informants found the solution to a drier climate to be quite simple: Just build more pipelines. But regardless of any perceived climatic change, the villagers wanted a pipeline from Jullu Khola, due to the high degree of uncertainty regarding the water supply from the two streams of Cheta Khola and Tonje Khola. Jullu Khola is a small river that flows a couple of kilometres north-west of the village. According to the DAO, this pipeline was already engineered and the construction was about to begin. But the villagers never mentioned this to me.

**Table 5. 2: The irrigation canals and pipelines of Ngawal**

Name	Source	Type	Size	Established
Cheta Khola I	Cheta Khola	Open canal, 460 m concrete	Small	1980-90
Cheta Khola II	Cheta Khola	Canal	Small	Pre 1900
Cheta Khola III	Cheta Khola	Canal	Small	Pre 1900
Cheta Khola IV	Cheta Khola	Canal	Small	Pre 1900
Tonje Khola I	Tonje Khola	Canal	Small	1997
Tonje Khola II	Tonje Khola	Open canal, 300 m concrete	Small	1980-90
Tonje Khola III	Tonje Khola	Canal, stream	Small	Pre 1900
Total length canals		≈ 3508 m		
Total length concrete canals		≈ 760 m		
Total length irrigation pipelines		≈ 220 m		
Total length drinking water pipelines		≈ 1030 m		

### 5.3.1 Maintenance of irrigation canals - provision

As in Manang, all the major irrigation canals are maintained before the wheat is sown. There are maintenance days, and the system seems quite similar to the old one in Manang. The farmers are organised in a canal committee. The rules are as following:

- 1) All the households have to send one worker to all the maintenance days.
- 2) Those who do not send a worker to the maintenance day will be fined. Same fines as in Manang. If the workers bring *ara* or have a good explanation for why they arrive late or do not show up the fine will be reduced.
- 3) Everyone can work at the maintenance day as long as they bring a good tool.

There is no provision of food during the work. The feeder canals are not the responsibility of the entire community and must be maintained on *ad hoc* basis by its appropriators. If a canal needs special effort beyond the maintenance day, it is the VDC who calls people to work.

Even if none of the canals are very long, some are situated on slopes and are often damaged by small landslides, according to some informants. Therefore some farmers regularly have to go out and repair the canals after rainfall. Some of the canals have sections of wooden pipes, and these need to be replaced every tenth year. The problem is that to make

the wooden pipes is very labour intensive, and because the forest is protected, the farmers have problems finding appropriate materials for making them. And according to one informant, the wooden pipes deteriorated due to lack of male labourers. On the other hand, another informant said the general canal maintenance did not suffer from lack of workers.

A lot of the fields around Ngawal are abandoned due to out migration, but this is land that for most of the part was unirrigated, according to the informants. Still, it is possible to imagine that the overall uncertainty related to the dependency of rain has decreased compared to the situation where a substantial portion of the fields were unirrigated, since now most of the fields are irrigated. I found some abandoned canals that were connected to cultivated fields. These were abandoned due to their dependency on wooden pipes. In the case of Ngawal, lack of male labour may lead to a lower standard on the maintenance of the irrigation system, at the same time as migration has not lead to a better availability of water due to abandonment of fields.

The government had provided some plastic pipes, but too little and of too small dimensions according to several informants. The government has also provided some cement, but too little for it to matter, according to one informant. According to one informant, the strategy of most of the farmers “is to do as little maintenance as possible and pray for rain while they wait for pipes from the government” (Young female Ngawali lodge owner).

### **5.3.2 Water Sharing - appropriation**

The appropriation of water for irrigation follows some clearly defined rules in Ngawal. The rules are crafted by the appropriators themselves. None of the informants knew if the rules were written down.

- 1) The succession of the irrigation of the fields are decided on a first come – first serve basis.
- 2) An appropriator who wants to irrigate has to put a little stone in a particular place along the canal she wants to use, under witness by another appropriator. The next one to irrigate is the one who put a stone after the first irrigators’ stone.
- 3) The appropriator might irrigate until she has finished with one plot.
- 4) Appropriators have to sleep in their own house the night before they are going to irrigate. If someone sleeps out in the fields in order to be the first to irrigate, it regarded as cheating and the person will be fined.
- 5) The appropriators from the Tonje Khola canals must stop irrigating between four p. m. and six a.m., so the downstream village of Ngawal Beshi can use the stream



for their mill. If a Ngawali farmer wants to irrigate during this time at the day, he must pay the farmer who is going to use the mill 350 to 400 rupees.

- 6) The appropriators of the uppermost Cheta Khola canal are not allowed to divert more than  $2/3$  of the water in the stream into the canal when they are irrigating. If they do they will be fined with 50 to 200 rupees.
- 7) Water theft reported to the VDC will first be sanctioned with a warning. If the water stealing continues, the thief will be fined. By apologize or provide *ara* to the insulted, the thief might not be fined, or the fine will be reduced.

In 2004, there was too little water in the streams to allow the farmers sufficient irrigation, even if the farmers irrigated during the night. Fighting occurred all the time in this period, according to all the informants. Most of the fights were solved on the spot while more serious disputes had to be settled by the VDC chairman. The conflict over water took many shapes. One frequent source of dispute occurred when the next appropriator in the line started to take water before the first one had finished. Another frequent problem occurred if someone took water without it being their turn. Some informants complained that the rich people took all the water, while the poorer always lost the disputes over water. The appropriators of the Tonje Khola also found it very frustrating to stop irrigating because of the water mill in Ngawal Beshi. At the same time, the mill in Ngawal was not functioning because there was too little water in Cheta Khola, so the farmers in Ngawal had to grind their grain at the Ngawal Beshi mill.

According to my survey (see table 5.3) Most Ngawalis were generally dissatisfied with the irrigation management system, had problems with water shortage and had been involved in fights over water. The water supply situation in Ngawal seemed to be much poorer than in Manang. Is this due to differences in available water resources, and in that case, are the appropriation rules not tailored well enough in relation to the resource attributes? And why have the Ngawalis not been able to self-organise for collective action in order to improve their water supply? In chapter 6.2 I will highlight the differences between Manang and Ngawal by looking at the factors and variables Ostrom (1990) uses in her model of collective action.

### 5.3.3 Drinking water

There are a lot of taps in Ngawal installed at the same time as the taps in Manang in 1997 under the UNICEF safe drinking water project. The taps get water from a pipe to Chetta Khola. This pipe is two years old and was installed in order to replace a pipeline from Tonje Khola that had broken. However, the taps were very often dry, because the villagers had trouble maintaining the new pipe as well. In summertime the intake was jammed by leafs and pine needles, and in winter it sometimes froze.

There is no committee in the village responsible for maintaining the drinking water system, and the DSDWS transfers the responsibility for the system to the village when they finish a project. According to what many villagers said, it is not difficult to clean the drinking water intake for leaves, but since it was no one's responsibility, it was not done and the taps could be dry for long periods of time, according to the informants. Some of the irrigation canals ran through the village, and many villagers therefore took their drinking water from the irrigation canal running through the village trail (see pic. 3.2). This water was often muddy. Several informants were complaining over the fact that this canal went dry if upstream farmers were irrigating. There was also a spring on a meadow some 200 meter outside the village, where many villagers went to fetch drinking water. One informant had this comment to why many villagers were satisfied drinking water from ditch in the street: "The villagers are uneducated and lazy, therefore they prefer to take water from the street instead of fixing the drinking water pipeline" (Young female Ngawali lodge owner).

The drinking water system in Ngawal is unmanaged; the Ngawalis have not been able to undertake collective action in order to secure their own drinking water supply. This displays a classic problem of collective action. The underlying factors and possible explanations for the deteriorated state of the Ngawali drinking water system I will discuss together with the other differences between Manang and Ngawal in chapter 6.2.

### 5.3.4 Water and rituals

As in Manang, rituals for water were an ordinary part of the daily life. And as in Manang, most people worshipped the snake god Loo for water. If the streams had little water, the village lama would go to the source on a meadow east of the village and perform a *puja* by spraying yak milk and reading from the Tibetan book. In opposition to Manang, this ritual was regularly practiced. In Ngawal they did not worship *Bodzo Kaeba*. This god is obviously only worshipped in Manang and Tenki Manang.

The villagers said that the drier it was, the more people would pray for water, and make the *puja* to the stream. “This year we have already made two pujas for rain, and now we soon are going to make one more” one informant said, and added that in the village of Pisang, where they totally lacked irrigation, they completely relied on prayers for rain to secure the harvest. As described in section 5.3.1, one informant said that villagers preferred to pray for rain and wait for the government to provide pipes instead of trying to improve the canals with the means they had. This latter phenomenon could indicate a rent seeking attitude among the Ngawalis, and that could certainly hamper their ability to cooperate in order to achieve collective action, according to different case studies cited in Ostrom (2000), as well as a fatalistic attitude towards development and resource management.

#### 5.4 Results from households survey

A household survey measuring the villagers’ relation to the irrigation systems and details about the household members was carried out during the fieldwork in April 2004 with the help of interpreters. Number of respondents in Manang are 32, in Ngawal 25.

**Table 5.3: The appropriators’ relation to the irrigation systems the five last years**

Question (Y/N)	Results Ngawal, percentage positive answer	Results Manang, percentage positive answers
Problems with water shortage?	96%	53%
Poor harvest due to lack of irrigation?	88%	56 %
Involved in fight over irrigation ?	80 %	45 %
Satisfied with irrigation management system?	12 %	69 %

**Table 5.4: Demographic data**

	<b>Ngawal</b>	<b>Manang</b>
Percentage of householdmembers living outside village	33 % Of these are 21 % men, 12 % women	22 % Of these are 16% men, 6 % women
Percentage of households having members living outside village	68 %	60 %

There were some problems with this survey; these are mentioned in chapter 3. Nevertheless, the survey supports the general picture of the difference in water supply between Manang and Ngawal. Nearly all of the respondents in Ngawal had problems of water shortage. When I asked the respondents some “whys” about their answers, it was evident that the respondents considered there to be water shortage if they had to irrigate during the night. That was a sign of water problems. And more evident; it was a problem and the respondents were dissatisfied if the water shortage could threaten their yield. In Manang, those farmers who were not able to utilize the canals supplied by the Gyanchang Khola pipeline had more problems and were less satisfied with the irrigation management system than the rest of the villagers. But overall, almost twice as many of the Ngawalis than the Manangis answered that they had problems with water shortage and were dissatisfied with the water management system. When I asked why, the response tended to be “we need more pipes”.

**5.5 Summary**

The results presented in this chapter can be summarized according to the research questions:

- Manang is generally much better off regarding both irrigation and drinking water supply than Ngawal, even though it is evident that the farmers also had problems if there was lack of rain, particularly those who could not take advantage of the Gyanchang Khola pipeline. The results from the household survey showed that nearly all the respondents in Ngawal were dissatisfied with the irrigation system, had problems with water shortage and had been involved in fights over water, while roughly half of the Manangi respondents answered yes to these questions.
- Both in Manang and Ngawal, the use and maintenance of irrigation were institutionalised by rules. The level of organisation seemed to be higher in Manang

than in Ngawal, with dedicated user groups, and more rules regarding provision. In Manang, the maintenance of the drinking water system was formalised by employing a technician. In Ngawal, the drinking water system was unorganised.

- Migration influences the water supply in two ways: 1) Permanent out-migration leads to abandonment of fields, which increases the availability of irrigation water on the cultivated plots left. This happens directly if the abandoned plots used to be irrigated and indirectly if farmers can swap their un-irrigated plots with the irrigated abandoned plots. 2) Out-migration might lead to a shortage of male labour. In Manang, this was insignificant, while in Ngawal, it seemed like the maintenance of the irrigation systems suffered from lack of male labourers. In-migration might also have effects on the water management, this aspect I will discuss in sections 6.2 and 7.2.3
- Technological change has first and foremost been through the introduction of plastic pipes, which has both increased the overall water supply and reduced the need for labour for maintenance. Similarly, pipes require different models for maintenance than canals. Several broken irrigation pipelines in Manang and the problem with the drinking water system in Ngawal indicate that this is a challenge to a long term sustainable water supply.
- Climatic change was not a topic among the villagers in Manang and Ngawal. But according to several informants in both villages, the climate had become drier. Their solution to meet this challenge was simply to build more plastic pipes, eventually pray when there was little rain and little water in the streams.
- Both in Manang and Ngawal did rituals and prayers for water take place, but the frequency of rituals seemed to depend on the water supply. In Manang, *pujas* for water rarely took place except for one annual ritual, while in Ngawal *pujas* were performed quite frequently. One informant said that the Ngawalis preferred to pray for rain instead of work to improve their water supply.



Pic. 5.3: A Ngawali woman is washing clothes in an irrigation canals that goes through the village. The canal is here seen coming through a *chorten* where it drives a prayer wheel.

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## **6 Is the water management sustainable?**

In both Manang and Ngawal, the irrigation system and to a certain extent the drinking water system were managed by its appropriators. The water resources can therefore be said to be managed as commons. The appropriation from the irrigation canals and the provision to its maintenance were institutionalised as rules. Therefore the irrigation management institutions are also common pool resource (CPR) management institutions. The drinking water was also a CPR, but appropriation and provision were only to a limited extent institutionalised. The aim is to analyse the water supply situation in general, not only irrigation, and therefore I include the drinking water, even though this chapter mainly focuses on the irrigation system.

In order to analyse how the communities of Manang and Ngawal are managing their water supply, I will analyse the management institutions using Ostrom's framework (1990). The aim is to discuss whether the management institutions of Manang and Ngawal will provide long term sustainable use of their water resources and whether they are able to change their management institutions in order to adapt to contextual changes. The previous chapter revealed that there were differences in the ability of the Manangis and the Ngawalis to sustain their water supply. These differences I will also discuss by using Ostrom's framework. Ostrom's framework does not aim to be a general theory of CPR management, but it presents factors, conditions and principles that characterises long term successfully managed CPRs (ibid). This chapter aims to provide an answer to the first of the two theoretical research questions - how Ostrom's CPR framework can be used to analyse the water management institutions of Manang and Ngawal. This question also implies a critical attitude towards this framework (ibid), and where the framework has its limitation I will look at more recent contributions to CPR theory and criticism of the entire CPR approach.

### **6.1 The design principles and the water management in Ngawal and Manang**

In this chapter I will to some extent follow the same structure as section 4.3, by first briefly repeat the puzzles, or dilemmas, that the Manangi- and Ngawali irrigation appropriators meet. Then I will see how Ostrom's definition of robust institutions as nested rules fits with the management institutions of Manang and Ngawal before comparing these institutions with the

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design principles. In chapter 5.2 I will discuss why there are differences between how the villagers in Manang and Ngawal are able to sustain their water supply by looking at the factors and variables that Ostrom (1990) finds to influence the ability to undertake collective action.

### **6.1.1 The puzzles of the irrigation systems**

The appropriators of the water resources in Manang and Ngawal face the same dilemmas as most appropriators of CPRs. These are first order dilemmas regarding use of a CPR, and second order problems connected to how institutions can be crafted to avoid the first order dilemmas (Ostrom 1990). The potential first order dilemmas that face the water appropriators in the Manang Valley can, by still using Ostrom's terminology (*ibid*), be divided into provision- and appropriation problems. The provision problem regards how to make the appropriators contribute with labour, materials or money to the construction or maintenance of a CPR. To build and maintain a traditional canal irrigation system is labour intensive and requires the joint effort of the villagers. But why bother to provide if it will be possible to free-ride and appropriate water anyway? It is difficult to exclude users from irrigation canals, irrigation canals therefore share the characteristics of a public good. According to the Non-contribution Thesis, no rational individual will contribute to a public good voluntarily because of the free-rider problem (Olson 1965). The challenge to the Manangi and Ngawali institution makers were to make rules that made the providers to the irrigation system confident that free riding should be avoided. The providers need to be confident that their individual benefit will be increased only if they contribute to the irrigation system. The motivation to contribute, given that free-riding is avoided, should be quite strong in Manang and Ngawal, where agriculture without irrigation would involve a high risk of failed or reduced harvest.

Appropriation problems regard how to achieve sustainable use of a resource. According to the Tragedy narrative (Hardin 1968), rational self-interested behaviour for the individual will be to extract as much as possible of the resource, which again produces a collective sub-optimal result. Water is a non-extractable and renewable resource and is therefore less vulnerable to overuse than the pasture described by Hardin (*ibid*). But the capacity of the irrigation canals is limited, so it is possible for the upstream users to appropriate all the water, leaving nothing for the downstream users.

To overcome the first order dilemma of appropriation- and provision problems, the appropriators of the irrigation systems in Manang and Ngawal need to have rules that regulate provision and appropriation of the irrigation system. But there are second order dilemmas



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associated with the process of establishing rules for resource appropriation and provision, because these rules have the features of a public good. The determination of to what extent these puzzles have been solved in Manang and Ngawal is the topic for the next chapter.

### **6.1.2 The management institutions analysed**

Before comparing Ostrom's design principles to the irrigation management systems of Manang and Ngawal, I will discuss how the management institutions in the two villages match Ostrom's definition of robust management institutions.

According to Ostrom, robust institutions consist of different interconnected layers of rules (see section 4.3.2), where the appropriators must be involved in the decision-making process at all levels. In the case of Manang and Ngawal, it is demanding to find all the three levels of rules. The *operational rules* are the most easy to identify, they are the rules mentioned in sections 5.2.2, 5.2.3, 5.3.1 and 5.3.2, the maintenance rules and the water sharing rules of the irrigation system. These rules have evolved over time, crafted by the villagers themselves in village meetings, the *Panch Chong*. The procedures for these meetings would correspond to the *collective choice rules*. The *collective choice* rules can be said to be tradition and procedures for the village meetings, the *constitutional rules* then become the principles for how seniority is achieved and the fundamental traditions that underlie all governance in the two communities. It is thus possible to look at the irrigation management institutions as nested rules, but at the collective choice level and at the constitutional level, it ceases to be purposive irrigation system rules. A further analysis of these aspects of the irrigation systems goes beyond Ostrom's framework, because her framework does not include non-purposive institutions in management of CPRs. In chapter 6.2 I will return to this.

The design principles that Ostrom defines (1990) concern the operational rules of the management institutions. If the CPR management institutions meet these principles, they are likely to provide long-term sustainable utilization of the CPR.

I will now compare the rules and features of the irrigation management systems in Manang and Ngawal through Ostrom's design principles (1990):

#### 1) Clearly defined boundaries

- a. *Manang*: The boundaries in the irrigation system exist so that the right to appropriate water from the irrigation canals is regulated and limited through the water sharing rules. The resource is the irrigation pipelines and canals and the water provided through these installations. The appropriators include all

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the villagers who have irrigated fields. In this sense the resource system has boundaries, and the users form a defined group.

b. *Ngawal*: Same as in Manang

2) Congruence between appropriation and provision rules

a. *Manang*: All the appropriators of the canals have to participate in maintenance of the canals. In order to be allowed to appropriate water, it is required that the farmer also contributes to the provision. The support for the provision and the contribution to the maintenance days, seemed to be very good, which indicates that the cost of provision was matching the benefits from appropriation. In an irrigation system, free riding is to take water without being a provider to the system. In this sense, the free rider problem was little or non-existing in Manang. The appropriation rules matched the attributes of the resource by specifying in which way the water sharing should take place.

b. *Ngawal*: As in Manang, the appropriators are obligated to provide to the irrigation system by contribution of labour to the canal-maintenance. The appropriation rules were also aimed at matching the attributes of the resource, by specifying how the water should be shared. But since these rules were frequently broken, the question is whether they were good enough. Perhaps they were designed for a situation with more water than there was when the study was conducted. Due to the frequent rule-breaking, it is reasonable to claim that the appropriation rules do not match the resource attributes very well.

3) Collective Choice arrangement

a. *Manang*: The management rules in Manang are rooted in an old tradition of village meetings, where all the farmers meet, agree on decisions and appoint or elect leaders. In Manang, the appropriators have been able to change the rules regarding both provision and appropriation.

b. *Ngawal*: The appropriators themselves make the rules for both appropriation and provision in village meetings, as in Manang. But there had not been any changes in the management system.

4) Monitoring

Monitoring is one of the two most important prerequisites for ensuring commitment to the rules (Ostrom 1990). Due to the high support for the provision rules in the irrigation system of both Manang and Ngawal, water theft could not be termed free-riding, but just rule infringement. Monitoring can therefore not be said to be important to avoid free riding. But the support for the appropriation rules were due to its nature more contingent, the temptation to take water beyond ones right might be very strong in times of water shortage. Under such circumstances monitoring became crucial in order to avoid breakdown of the system. The rule breakers must know that the chance of getting caught is high, so they are less tempted to break the rules. The contingent behavior also depends on *sanction* towards those who get caught for rule infringement.

a. *Manang*: Monitoring of the use of the irrigation canals was not specified by any rules. On the other hand could monitoring in most circumstances easily be carried out by the appropriators while they were irrigating or doing other work in the fields. In times of water shortage, it was practiced that the irrigator who had the turn had one person to guard the upstream part of the canal. The motivation to monitor under this circumstance was obviously strong: If there were no one to look after the canal, the risk that someone would take water upstream without turn was high. Monitoring thus had low cost, and possessed no second order problem.

b. *Ngawal*: Neither here was monitoring institutionalised. Most of the canals could easily be monitored by the appropriators during irrigation. It was widespread to use extra manpower to guard the canals, and the motivation to do so was the same as in Manang in times of water shortage. Water shortage was widespread, and some informants complained that they always needed to use costly labour power to watch the upstream part of the canal during irrigation. And even so, water theft was widespread. Due to the persisting water shortage, the temptation to break the appropriation rules was strong among a high number of the appropriators. So even the high risk of getting caught and having to face a fight or a fine did not stop rule infringement.

5) Graduated sanctions

In Manang and Ngawal, the breaking of both appropriation rules and provision rules was sanctioned with a warning or fine. For the appropriators to apply sanctioning

implies a second order problem of collective action. The carrying out of a sanction has a cost for those who do it. In both Manang and Ngawal it seems like they overcame this second order problem by delegating the task of sanctioning to institutions.

- a. *Manang*: Sanctioning of breaking of provision rules were applied by the canal user groups themselves. Since this institution had sanctioning of non-contributors as one of its purposes, the sanctioning itself possessed no second order problem. The fines were low and graduated. Breaking of the appropriation rules or water theft was sanctioned by the VDC. Also these sanctions were gradual, from a warning to fines of different size. This design-principle is therefore fully met in Manang.
- b. *Ngawal*: Sanctioning of both provision- and appropriation rule-breakers were applied by the VDC. The sanctions in both circumstances were gradual. The question in Ngawal is rather to which extent monitoring and sanctioning provided compliance with the rules.

6) Conflict resolution mechanisms

In both Manang and Ngawal, the conflicts that existed in the water management system were always related to water sharing. These conflicts were either solved on the spot between the counterparts, or it was taken to the VDC. The VDC was therefore the formal conflict resolving body. More principal questions were discussed on *Panch Chong*. Regarding the *Panch Chong*, I did not find any cases related to water management, but there were one remarkable incident in Manang regarding poaching: Two poachers were caught killing protected muskdeers. Instead of turning the poachers over to the police and ACAP, the villagers arranged a meeting where they decided to give the poachers large fines (700.000 rupees and 300.000 rupees). The fine could therefore be kept by the VDC, instead of ACAP.

7) Minimal impact of rights to organise

Both in Manang and Ngawal, the irrigation systems were self-invented and self-organised. Even if the governmental irrigation offices prescribed a management model for small irrigation system (the FMIS-model), as part of their support to the construction of irrigation pipelines, it was not necessary to implement this in Manang and Ngawal due to their existing institutions. Because of this, no external authorities

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were directly involved in the management of the irrigation systems, neither in rule-making, monitoring or sanctioning.

To summarize: In Manang, all the design principles are met, but some problems with obedience to the appropriation rules in times of water shortage might occur. In Ngawal, they meet the design principles to a large extent, but had still huge problems with breaking of the appropriation rules. The appropriation rules were possibly not tailored well enough to match the resource attributes, more specifically the regularity and flow of the resource. There were also some problems with the provision, and it is possible that the motivation for undertaking provision could be lowered due to the appropriation problems, thereby creating a mismatch between provision and appropriation.

If the design principles are met, the resource utilisation should be sustainable, according to Ostrom. But is the irrigation system in Ngawal sustainable? It might be, but they have a problem with non-obedience to the rules. Did the monitoring and sanctioning not work? And why had they not been able to get themselves a better water supply? The distance to the nearest stream (Jullu Khola) with a more stable water flow was much shorter than in Manang (see map 5.1 and 5.4). The next chapter addresses these questions by looking at the two communities' ability to undertake collective action.

## **6.2 Is it the ability to take collective action that matters?**

In order to discuss the two communities' ability to self-organise for sustainable use of their water resources and highlight the factors that can help explain this ability, I will look at the differences in how the Manangis and the Ngawalis manage their water systems. In this chapter I will look at the water management in general, not only the irrigation system. I will apply the factors and variables presented in section 4.3.3, that Ostrom finds to influence the ability to achieve institutional supply, and discuss whether these are relevant as explanatory factors for explaining the differences in how Ngawal and Manang are able to sustain their water supply.

According to my survey (see table 5.1), the Ngawalis fought a lot more over water, had more water shortage problems and were much less satisfied with their water management system than in Manang. These differences are connected to four major differences in the two communities' water systems: (a) In Ngawal, water shortage is usual in the spring season, and

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appropriation rules are frequently violated due to water theft; (b) the Manangis have been able to organise themselves in order to construct the Gyanchang Khola pipeline and two other pipelines, and thereby solved their worst water shortage problems; (c) the Ngawalis have not been able to organise maintenance of drinking water system and it is therefore failing; (d) the Ngawalis has some problems with maintaining their traditional irrigation system (the wooden pipes) due to lack of qualified labour and materials; (e) and finally, the Ngawalis performed more rituals and prayers for water than the Manangis. Is it really because the Ngawalis rely on prayers for rain that they have no piped water? In this chapter I will just briefly discuss rituals and religion in relation to the ability for collective action, but I will discuss the relationship between the water supply and rituals more thoroughly in section 7.3.

Are these differences just a matter of differences in available resources? Or is it a matter of ability to undertake collective action? For the appropriators of the irrigation systems to be able to sustain a long term management of their water supplies, they need to be able to change the management institutions or supply themselves with new rules as responses to social or environmental changes. Institutional supply takes place both as initial establishing of management institutions and as incremental changes to adjust the management institutions as responses to contextual changes. The last aspect is important when explaining how CPR appropriators are able to adjust their management system in responses to contextual changes. Therefore the ability for institutional supply is important for sustained, long term CPR management.

The ability for institutional supply is a question of self-organisation, according to Ostrom (1990). Different case studies give a vast number of different factors influencing the ability for self-organisation for collective action purposes. I have focused on the ones Ostrom emphasises (1990, 1994, 2000). The design principles aim to provide sustainable long term use of the CPR, while the factors and variables mentioned in section 4.3.3 are found to be important for determining whether or not a CPR management regime can be installed by self-organisation and how likely it is that it can be changed. It is this last aspect that is the topic of this chapter. I highlighted the following factors and variables: (1) *Strong shared norms*; (2) *Expected benefits* and (3) *costs*; (4) the *discount rate* in use; (5) The *total number* of decision makers; (6) the *heterogeneity* of the participants; and (7) the presence of participants with *substantial leadership* or other assets (Ostrom 1990, 1994, 2000).

But also other factors, not emphasized in Ostrom's framework, might be relevant for the case of Manang and Ngawal, and they will be mentioned in the following discussion.

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Both in Manang and Ngawal, the irrigation management institutions did to a large extent correspond with the design principles. That institutions exist for sanctioning and that monitoring is practiced means that the cost associated with undertaking these activities is small. There is little involvement in the water management from external authorities and the number of participants in both Manang and Ngawal is quite small, both of which are factors that facilitate collective action (Ostrom 1990). Both in Manang and in Ngawal, the appropriators have utilized the resource for a long time, and they live together in the same villages. According to Ostrom, this should make their discount rate to the resource low. The presence of self-invented CPR management institutions shows that the CPR-appropriators in Manang and Ngawal are able to undertake demanding collective action tasks. So this discussion will focus on how the other factors mentioned are related to the differences between Manang and Ngawal.

### **6.2.1 What are the differences between the two villages?**

In the following section I will briefly repeat some features of the two communities in order to look at differences that can help explain the differences to take collective action.

In Manang, the population mainly consists of native Manangis. The Manangis have strong community ties, according to the informants. There were considerable differences in income and wealth, because several successful Manangi businessmen had resettled in Manang and built hotels. But according to most informants, wealth did not play a crucial role for status as a Manangi, they seemed to be proud to have an egalitarian community. I also several times observed the wife of a wealthy hotel owner irrigating in night-time. The villagers of Manang, and thus the appropriators of the irrigation system, can be considered a quite homogenous group in terms of ethnicity, but not in wealth. The presence of the resettled businesspersons who have started hotels means that the village has many resourceful people who can provide leadership. This was crucial when Manang got the Gyanchang Khola pipeline, which to a great extent was achieved through the effort of one Manangi hotel owner. The establishment of the Gyanchang Khola also displayed that social relations or network to decision makers in the District administration matters. Social relations that can be utilized for achieving certain benefits can be termed *Social Capital*. Social capital has a lot of definitions, but here I will apply Bourdieu's definition: "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalised relationships of mutual acquaintance or recognition" (Bourdieu 1985 (in Portes 1998, 4)). Through the

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possession as District Chairman one of the hotel owners in Manang was able to draw on substantial social capital when the Gyanchang Khola pipeline was established.

The resettled Manangi businessmen can also be termed entrepreneurs, as they have been able to explore and take advantages of the commercial opportunities that arose with tourism. According to Rogers, the entrepreneurs of Manang have

*(...) insight, innovative vision, confidence in one's own abilities, a willingness to take risk and some experience or knowledge or at least intuition about how to undertake a business venture (Rogers 2004, 65).*

Rogers also find the entrepreneurial attitude to be characteristic for the Manangis as a group, a characteristic that requires social systems of reciprocity and cooperation that support individuals to engage and succeeds in business ventures (ibid).

That there are few resettled businessmen in Ngawal is related to the relative poorer business opportunities there compared with Manang. Manang is along the main trekking route, Ngawal is not. The potential for tourist related business is therefore better in Manang.

The Manangis claimed that the irrigation system had existed for hundreds of years and they have been able to change the management as responds to contextual changes. Even if the fines for not contributing to the maintenance of the canals were insignificant for several of the relatively wealthy appropriators, they still contributed. And they have been able to get the Gyanchang Khola pipeline. These things indicate strong shared norms regarding the resource use, and together with leadership provided by the resettled business men and the entrepreneurial spirit found in the community. Manang did also have a variety of collective solutions like the the *Panch Gong*, a variety of religious festivals and different committees and groups for different purposes. These are factors that underlie the Manangis ability to undertake demanding collective action tasks.

Ngawal has a higher proportion of immigrants than Manang. My household survey indicates that the proportion of non-Manangis is higher in Ngawal than in Manang (16% in Ngawal and 3 % in Manang). Also in the opinion of the Ngawali informants, the immigrants from Nar-Phu and Dolpo were significant parts of the population in Ngawal. These peoples share much of the same Tibetan influenced culture and they are Buddhists. Still, they are not allowed to buy land or houses in the village, and intermarriage is not very popular among the native Ngawalis. They are therefore not gaining the same status as the native Ngawali inhabitants. The immigrants do not necessarily share the same norms regarding the resource



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use, and the native inhabitants do not necessarily trust the immigrants as they trust other natives. In opposition to Manang, heterogeneity in respect to wealth could also matter in Ngawal, because some informants said that the rich dominated the poor when it came to conflicts over water. In Manang none of the informants complained about this. So I find it fair to suggest that the ability to collective action could be weakened due heterogeneity in Ngawal. This heterogeneity is a result of immigration. Migration has also been mentioned by Ostrom as a factor that might weaken the ability for collective action (2000), but she does not include this factor in her framework. The importance of migration therefore has to be discussed more thoroughly. This I will do in section 7.2.3.

There is also a higher proportion of household members living outside the village in Ngawal than in Manang (22% in Manang, and 33 % in Ngawal, according to my survey), and of those the majority are men (21% of the male household members in Ngawal, according to my survey). Also according to both my own observations and to my informants, there were a lot more women than men in the village. The male out-migration might also weaken the irrigation management because it deprives labour from maintenance work, which can help explain why some informants complained about problems of maintaining the wooden pipes in the irrigation system, also one of the mentioned differences between Manang and Ngawal. This is also a factor related to migration, which will be discussed more thoroughly in section 6.3.2.

The amount of people who have resettled in Ngawal after successful business ventures is much smaller than in Manang. Ngawal therefore have considerably fewer “big men”, entrepreneurs that can take leadership and initiative. Ngawal therefore also lacks people with social capital that can be utilized for purposes like getting pipes. But fewer returned businessmen also means that the differences in wealth among the Ngawalis are smaller than in Manang.

The presence of different collective arrangements, as *Panch Gong*, and various village committees, seemed weaker in Ngawal than in Manang. They were never referred to during conversations with informants, and the ACAP-initiated committees were ineffective according to the informants. Most of the power seemed to be within the VDC, and the VDC chairman was not even living in the village, but in the neighbour village Ngawal Beshi.

To sum up, the differences between Manang and Ngawal in aspects of the communities seems to be in presence of leadership, population heterogeneity, migration and perhaps the number of different collective arrangements. The next chapter focuses on these differences and the differences in ability to sustain the water supply.

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### **6.2.2 The water conflict in Ngawal**

In Ngawal, the appropriators who did the monitoring were as likely to see that the other appropriators were breaking the rules as to see that the rules were followed. This was a noticeable difference between Manang and Ngawal. This phenomenon might be discussed looking at several of the factors and variables mentioned: The expected benefit from following the rules must be higher than the cost. In times of water shortage, the temptation to break the rules is very high because the yield might be destroyed if the appropriator does not get enough water. The short term benefit from breaking the rules might be that the harvest is secured, this is an individual benefit. The long term cost from breaking the rules is a lower collective output from a non-functioning water allocation system. This is shared among all the appropriators. The logic is the same that Olson describes in the classic dilemma of collective action (1965), and by Hardins' Tragedy narrative (1968). But there are also other costs by breaking the rules, not described by Olson and Hardin. These are the sanctions the rule-breakers face and the loss of reputation. Loss of reputation is connected to norms. Ostrom finds that appropriators living together in small, homogenous communities near the resource tend to develop strong shared norms regarding the use of the resource over time, due to their collective fate connected to the state of the resource, the importance of reputation and high levels of trust and reciprocity (ibid). Only in time of crisis will the temptation to break the rules be so strong that it actually occurs. So do the Ngawalis not share strong norms? They live close to the resource, live in the same village, do other activities together and have utilized the resource for a long time. All this should indicate that they have strong norms regarding the resource use. But there are many immigrants in Ngawal. The question is whether these share the same norms, and are trusted like native Ngawalis. This leads to factor (5), the level of heterogeneity. Heterogeneity in ethnicity might weaken the presence of strong shared norms, and it might therefore indirectly be a factor that can help explain the frequent rule infringement in Ngawal. The heterogeneity is a result of a contextual factor not mentioned in Ostrom's framework, migration. I will come back to the implications of migration later in section 7.2.3.

Or is the reason why the appropriators in Manang so frequently break the appropriation rules rather that the water situation is in a permanent state of crisis, a permanent state of exception? According to many Manangi informants, there was a lot of fighting over water in Manang too before the Gyanchang khola pipeline was established. And there were still sporadic incidents in times of shortage. Similarly, in Ngawal, the appropriation rules were followed as long as not all the appropriators needed to irrigate simultaneously. According to

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Ostrom (1990) did rule infringement take place now and then in times of crisis in most of her reviewed case studies. Absolute rule conformity is unrealistic, she argues (ibid). This is also why the sanctioning fines are low, because robust systems must tolerate some rule infringement in times of crisis (ibid). The fines for breaking the appropriation rules are low in Ngawal. If they were higher, they could possibly have resulted in a lower degree of rule infringement. But similarly could this have had devastating effects on the appropriators' economy, which again could undermine the support for the management system in general. That the rule-infringement occurs as a consequence of water crisis raises doubts over the conclusion that the Ngawalis frequently break the appropriation rules due to weak ability for collective action.

### **6.2.3 Why there is no pipes in Ngawal**

The second difference between Manang and Ngawal is that the Manangis have been able to secure their water supply by building the Gyanchang Khola pipeline. The Manangis has also replaced several old open canals with pipes. Why have the Manangis been able to construct these pipelines and the Ngawalis not? Before the pipes were introduced, I assume that the water situation in Manang and Ngawal were quite similar, due to the situation of the villages and the fields in proximity to natural streams. Manang is a much larger village, approximately four times as big as Ngawal, and therefore possesses larger resources. On the other hand, the distance from the nearest river to Ngawal, Jullu Khola, is approximately a third of the distance between Gyanchang Khola and Manang (see map 5.1 and 5.4). The question is if the reason why Ngawal does not have a pipeline from Jullu Khola is related to the ability for collective action. Ngawal lacks the businessmen found in Manang. In Manang it was precisely one of these men who took the initiative to establish the Gyanchang Khola pipeline. So the presence of leadership and entrepreneurship is a relevant factor for explaining the difference between Manang and Ngawal.

The third difference between Manang and Ngawal, the inability of Ngawalis to maintain their drinking water system might also be a result of the same collective action problem as the lack of appropriate irrigation water supply. It seems strange for an outsider that the cost associated with walking the 20 minutes from the village to the intake tank for the drinking water pipe and remove the leaves from the filter were higher than the unpleasantness by walking outside the village in order to fetch water. Or fetching water from the nearby irrigation canal, where the water was dirty and garbage and dung might float. A young female lodge owner said that the villagers preferred to take water from the irrigation canals instead of

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fixing the drinking water pipe, and that the villagers preferred to pray instead of trying to improve their water situation. The lack of maintenance represents a classic example of a problem of collective action. The individual cost of investing time and effort maintaining a public good is higher than the individual benefit from the same good (Ostrom 1990). The problem is that the Ngawalis has not achieved making any rules regarding the maintenance. Since the pipes are new technology to the water system, and the maintenance demands a new kind of management, this could be an explanatory factor for failing of the maintenance. Technology is a contextual factor not mentioned in Ostrom framework, but she mentions it as a possible threat against collective action (2000). The importance of technological change to the water system is more thoroughly discussed in section 7.2.2.



Pic 6.1: The drinking water intake in Ngawal. It is jammed by pine needles.

#### 6.2.4 Prayers and collective action

Both in Manang and Ngawal, people strongly believe that prayer and rituals could influence the amount of rain and water in the streams. The Ngawalis did perform more *pujas* and prayers for water than the Manangis. According to one Ngawali informant, the Ngawalis preferred to pray and wait for the government to provide pipes instead of improving their existing irrigation system. A tempting hypothesis is that the Ngawalis did not bother to construct a better water supply due to their strong expectations of external help from the government or external donors and belief in the effects of *pujas* and prayers. How a strong

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religious faith influenced the ability to undertake collective action is a different question. Religion is not included in Ostrom's framework or other important CPR approaches. It is not evident how it should influence the ability for collective action either. A *puja* is a collective undertaking, while prayers are personal and individual activities. But the individual cost of participation and contributing to a *puja*, as well as to pray, is different than having to work for weeks in order to construct a big pipeline or participate in a rule-making process.

The most likely reason why the Ngawalis prayed more than the Manangis is simply that they had more water shortage problems. Both in Manang and Ngawal, there were regularly *pujas* for different purposes, and each *puja* normally calls on a joint effort by a group of village women for preparing food and tea. It can obviously be assumed that when villagers perform rituals together, it strengthens their shared norms and sense of belonging, which again is one of the factors found to strengthen the ability for collective action (Ostrom 1990).

#### **6.2.5 Migration and lack of leaders with the "right connections"**

To summarize the factors I find most likely to explain the differences in the Manangis and the Ngawalis ability to undertake collective action I will emphasise the following: The lack of resourceful persons that provide leadership and the migration that still take place in Ngawal. These are factors that can explain why the Ngawalis have not improved their water supply and not organised the drinking water maintenance. But it would be a simplification to blame all the difficulties the Ngawalis face on weak ability for collective action. The breaking of the appropriation rules may indicate a problem of collective action, since they do not change the appropriation rules. But the rule-infringement may also take place because the Ngawalis find the water situation to be in a state of crisis.

There are of course also other factors that contribute to the difficult state of the water situation in Ngawal that are not related to collective action problems: (1) The size of the village and thereby less resources in terms of labour; (2) and the presence of villagers with connections to authorities who provide funding for pipelines.

The only difference between Manang and Ngawal that can solely be explained as a result of different abilities for collective action is the problem with the drinking water system maintenance. For the other differences, the reasons were complex and collective action is only one of several possible explanatory factors.

And as a closing remark to this chapter: Now it also appears that Ngawal will have their new pipeline from Jullu Khola, according to both the VDC chairman in Ngawal and the

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DAO officials. However, none of the villagers in Ngawal told me about this. The question is now whether the villagers of Ngawal will contribute with the labour required to get the pipe installed.

The next chapter addresses aspects of the water management system in Manang and Ngawal where I find that Ostrom's framework comes short. It takes a broader perspective on the discussion of how the villages are able to sustain their water needs than just that suggested in the CPR approach. In addition to that approach, it is necessary to look at the wider implications of migration, technological change, climatic change and religion.

## 7 Beyond the CPR framework

The presence of a lot of empirical and theoretical work on the conditions and factors behind successful management of CPRs and the ability for collective action are still not forming a coherent theory. The factors and conditions mentioned by Ostrom amount to fifteen, eight design principles plus seven factors which influence on the ability for collective action. And if this is not enough, several of the last factors are dependent on other variables. Additional factors not mentioned by Ostrom but by other writers such as Balland & Platteu (1996) and Wade (1988) make the list even longer. Agrawal finds that the mentioned authors jointly identify 36 important factors (Agrawal 2001). And they do only to a limited extent emphasise the same factors. Still the list of factors is not exhaustive. In most cases there will be factors and variables that are dependent on context or are contingent on other factors and variables. Agrawal sees the various CPR approaches emphasize similar and different explanatory factors as an indication that the CPR-literature still has to come up with a coherent theory of CPR management:

*When a large number of causal variables potentially affect outcomes, the absence of careful research design that controls for factors that are not the subject of investigation makes it almost impossible to be sure that the observed differences in outcomes are indeed a result of hypothesized causes (Agrawal 2001, 1661).*

Agrawal points at to a weakness with the existing CPR approaches that also is relevant for this case study. The list of factors and variables mentioned in the literature that might be relevant, is too long for making a careful examination of each factors' importance. Similarly there are factors not emphasised in Ostrom's framework that I have found to be important. Nevertheless, since Ellinor Ostrom currently is the author with the most comprehensive approach to a theory of CPR management, I have so far based my analysis on her framework. Still it is evident that it has certain limitations when applied to this case study. These are: (1) The focus on purposive management institutions, in this case the aspects that Ostrom terms collective choice and constitutional levels of institutions, which overlooks the fact that institutions involved in resource management may be multi-purpose institutions; and (2) the neglect of emphasis on non-local contextual factors, in this case migration, technology and climatic change; as well as the local, contextual factor religion. The first problem also

uncovers some problems with the rational choice theory and methodological individualism that Ostrom's framework builds upon.

I will address each point in the following chapters. Further I will address the importance of religion to the water management system, an aspect I have not treated yet.

## 7.1 Management outside purposive institutions

Ostrom's focus is upon purposive management institutions, and she defines *institution* as nested rules on an *operational* layer, a *collective choice* layer and a *constitutional choice* layer (1990, 51). But in the case of Manang and Ngawal, the water management institutions, or more correctly the irrigation management institutions, did only manifest themselves as purposive institutions on the operational level, as the canal user groups and the appropriation rules and provision rules. The two upper layers can also be identified, but not as the collective choice- and constitutional choice layers of purposive institutions, but as social structures in the villages that guide different kinds of practises, not only irrigation.

In Manang and Ngawal, the collective choice level manifests itself at the village meeting, *Panch Chong*, that are assembled by the VDC when important matters need to be discussed. When the irrigation management system in Manang was changed it was in a *Panch Chong*. *Panch Chong* is not a purposive management institution in the sense Ostrom refers to (see section 4.3.2), it is a multipurpose institution. If I should follow Ostrom's three analytical levels of rules, the constitutional level would correspond to the rules that regulate the *Panch Chong*. Both these rules and the *Panch Chong* is part of the *parampara*. The rules, or traditions, that govern the *Panch Chong* resemble the traditional social structures of the village, legitimated in the culture of the villagers. Only men can participate, and their influence is determined by age and clan. To propose that rules governing both constitutional and collective choice can be "artificially" designed and implemented in these circumstances does therefore not make sense. Cleaver comes to the same conclusion:

*The evolution of collective decision-making institutions may not be the process of conscious selection of mechanisms fit for collective action task (...) but rather the outcome of individuals acting within bounds of circumstantial constraints (Cleaver 2000, 366).*



Cleaver finds that the institutions involved in natural resource management often are created as routinized practices in daily lives, with a lot of borrowing of accepted patterns of interaction from other sanctioned social relationships (ibid).

Mehta et al. (1999) criticize Ostrom and the CPR approach for the conception of purposive management institutions, and claim that it draws the attention away from how other aspects of a community shape the management. Mehta et al. claim that resource management occurs within several institutions, which not merely serve economic or rational ends, but also symbolic constructs and meaning. They can therefore not be viewed only in purposive terms (ibid). Institutions must be viewed as social practices, shaped by social processes and power relations, they argue. “In many respects, natural resource management institutions and practices are synonymous with people’s everyday life practices and ways of viewing the world” (Mehta et al. 1999, 30). This critique is relevant for Manang and Ngawal, in the sense of what Ostrom terms the collective choice- and constitutional choice levels of the management institutions, are general social structures and the culture of the villages. Instead I propose to apply Aase’s concept of society as three analytical levels: social organisation, social structures and culture (1998).

In Manang and Ngawal, it is impossible to view the water system management as solely taking place within isolated purposive institutions. Rather, it should also be viewed as processes taking place at both the *social organisation* level, which is how people actually use the water and contribute to the maintenance; and *social structures*, which are the rules, norms and institutions regulating the use of water. What Ostrom terms collective choice and constitutional choice rules are also *social structures* that among other things govern how the management rules should be altered, and which persons that are eligible to do so. These social structures are legitimated in *culture*. This way of looking at resource management institutions is more fruitful than Ostrom’s definition of robust, purposive management institutions, because it sees the water management in a broader perspective, interrelated with other social processes in the community. To investigate how changes in the different analytical levels influence the water management system is the topic of section 7.2.3.

The presence of such institutions as the *Panch Chong* is also an important factor for explaining the ability for collective action, as it is an institution whose main purpose is to make the villagers undertake collective action tasks. Looking at other manifestations of collective action might produce a better understanding of the processes underlying collective action in the community. In Manang and Ngawal, collective action solutions exist for a variety of tasks, like preserving the forest or cleaning up the village. At the core of these

events is a decision taken by the *Panch Chong*. To understand collective action in the villages requires an understanding of the *Panch Chong*.

But the framework of Ostrom and other CPR-literature does not capture the importance of this non-purposive institution, at least not directly. This is because the underlying rational-choice foundation on which Ostrom builds her framework implies methodological individualism. Institutions are seen as set of rules created through a process of bargaining between rational, self-interest actors, where the actors evaluate benefits and costs on a basis of limited information. This bargaining process can be modelled as a game. This means that only acts of individuals matter. But *Panch Chong* is a manifestation of social structures that by guiding the acts of individuals actually enables and creates social processes. That social structures have the power to both enable and constrain individual acts is neglected by the rational choice theory.

As long as the concept of collective action builds on methodological individualism, it fails to capture the power of social structures and culture as explanatory factors for why a community might be able to manage their CPR with success or with failure. By applying concepts and method of local dialectics, aspects beyond those of Ostrom's' framework can be identified. This I will do in chapter 7.2.3

## **7.2 Contextual changes and the water supply**

Migration and introduction of new technology have had great importance for the development of the water management systems in Manang and Ngawal. These are contextual factors not emphasised in Ostrom's' framework, and so far just briefly discussed in the analysis. In this section I will also mention the impact of climatic change, since this also is a contextual factor with implications for the water system.

Edwards & Stein define contextual factors as: "Dynamic forces constituted in the user groups' social, cultural, economic, technological and institutional environment" (Edwards & Steins 1999, 207). It is evident that migration, technological change and climatic change have implications for both the ability for collective action and the water supply situation. The lack of emphasis on contextual factors in Ostrom's' framework is criticized by Agrawal (2001), Steins et al. (2000); Edwards & Steins (1999) and Mehta et al. (1999). Migration, new technology and climatic change are non-local, external factors to the water systems. In Ostrom's' framework, only design-principle seven, that external authorities should not interfere in the CPR-appropriators management system, refers to a non-local factor. Also the

factors and variables in Ostrom's collective action model (section 4.3.3) are local and endogenous. On the other hand is the problem of creating a list of general contextual factors apparent. I already mentioned how many general factors Ostrom and other CPR-authors have found to be important. Should the list be even longer, there would be enormous analytical problems to conduct a case study. Besides from this does the importance of contextual factors to a much greater extent vary from case to case than endogenous factors. Not to mention case-specific contingent factors. Still a framework that overlooks the importance of contextual- and case-specific contingent factors will come short. Agrawal and other critics address the need of including case specific and contingent factors in analyses of CPR management (Agrawal 2001, Edwards & Stens 1999). What Agrawal suggests is to have a systemic test of the relative importance of contextual factors on the CPR management, while Edwards & Steins (1999), suggest that contextual factors must be surveyed for each case, and their relative importance tested. Still these two approaches are just suggestions, and do not explain how the relative importance of contextual factors can be tested.

In the conclusion, chapter 8, I will present my thoughts to meet the mentioned challenges that the CPR approach face. So far my response has been to discuss the importance of migration, technological change and climatic change. The focus is on how it influences on the water supply situation in general, not only how it may influence on the ability for collective action. In chapter 7.2.2 I also apply the methods of local dialectics (Aase 1998), to get a broader frame for the processes and dynamics of migration in Upper Manang and its consequences for the water supply.

### **7.2.1 Climatic change and the water supply**

Climatic change is a contextual change that affects the water supply in Manang and Ngawal. It does not fit directly into Ostrom's framework and I have therefore included this topic in this section. Still I will use concepts from Ostrom's framework in the forthcoming discussion, and it is thus not "beyond the framework" as the other sections in this chapter.

Climatic change in the Himalayas is generally experienced as a drier and warmer climate, but there are large local variations (Chalise 1994 (in Banskota 2000)). The glaciers are shrinking, and the permanent snow line is moving upwards. It is also possible to identify this general pattern in Manang. The most noticeable change was the lack of snow in the mountains at the time of year when it normally used to be a lot of snow left in the mountains, according to the informants in Manang and Ngawal. Retreating glaciers were on the other hand not perceived as a problem for the water supply.

The consequences for the water supply from a drier climate are apparent – less water. Due to lack of precipitation data and recordings of past observations of the actual glaciers and snow cover, it is not possible for me to give any answer to whether and how climatic change has reduced the water supply in Manang and Ngawal. So what I tried to do was to study the consequences for the social organisation of the water management and possible strategies that the people of Manang and Ngawal can choose in order to cope with a situation of less water. This I have done in section 6.1 and 6.2.

CPR-theory has not been concerned with climatic change as a factor that influences the ability for collective action or long-term sustainable management of CPR. Nevertheless, it is not a difficult task to identify factors and variables that a drier climate can change: The amount of water is a crucial variable for the sustainability of the water management system, in more general terms: It regards the availability, variability and size of the CPR. These factors are not emphasised by Ostrom, but she found them to influence on how participators in an institutional supply bargaining process would evaluate benefits for committing themselves to the proposed rules (Ostrom 1990). This is related to design principle two, which says that the appropriation- and provision rules must reflect the resource characteristics in order for the management institutions to be sustainable (*ibid*). As seen in Ngawal, lack of water leads to conflict, and the question is whether the level of conflict threatens the water management system or whether the appropriators are able to deal with the water shortage through institutional or physical adaptations. In Manang, the improvement of the water supply was mostly a response to increased demand, not from decreased supply due to climatic change. In Ngawal, people say that they have always had problems with lack of water. According to Ostrom (1990), conflict could occur in times of crisis in all of her reviewed case studies. That a management system could tolerate sporadic conflicts without collapse means that it is robust (*ibid*). That the Ngawali water management system did not collapse hence the prevailing conflicts should then suggest that the system was robust. But then they should also be able to adapt to the situation with water shortages. But according to my survey, most of the respondents were dissatisfied with it (table 6.2). The only possible change of social organisation as response to a drier climate was fighting. But then this was not a new phenomenon. Institutional adaptations or changes in social structures to a situation with less water were not possible to identify in Ngawal. But on the other hand, changes in social organisation will over time change the structures. The fighting and rule infringement in Ngawal could then over time lead to changes in the irrigation management institutions. In

Manang they had changed the management system as a response to new technology and migration, not to a drier climate.

As in Manang, the Ngawalis wanted to respond to the need of increased water supply by constructing more pipes. And as a result of the pipes, the management institutions would need to change. This is one aspect where climatic change may change social structures.

The effects of climatic change on social practices and institutions are topics that have received little attention, even though the predictions mentioned in the introduction, the “meltdown” narrative (Hasnain 1999), should call for massive research on the responses and strategies that affected communities choose. If I should try to draw some conclusions from my findings, it must be that the strategies associated with a possible drier climate in Manang and Ngawal seem to involve more prayers and more pipes.

### **7.2.2 The black revolution: Pipes**

To address the implications of technological change on the water management system is also an attempt to include contextual factors in the analysis. In this sense this discussion goes beyond Ostrom’s framework. But on the other hand it continues to use concepts from the CPR approach.

The introduction of the polyurethane water pipes is by far the single most important component in the modernisation of the agriculture in Upper Manang and outweighs traditional green revolution components like fertilizer, pesticides and improved seeds (my observation and informant statements). While Manang has a high proportion of pipes in their irrigation system, Ngawal has approximately only 200 meter, besides some hundred meters of concrete canals.

Pipes reduce the maintenance needs and water leakage where it replaces open canals. More importantly, pipes have made it possible to lead water from rivers and streams that were out of reach from traditional technology due to difficult terrain.

There are two major implications of the new technology to the water system. The first relates to concerns expressed by various authors (Agrawal & Narain 1997, Mollinga et al. 2000) of the danger of modernisation of the water supply, first and foremost piped water, makes the traditional water harvesting techniques disappear. If the pipes get dry, entire villages end up with no water, because the traditional water harvesting techniques are abandoned (Agrawal & Narain 1997). As experienced in a large number of development projects, infrastructure installed by state or NGOs face deterioration when no adequate maintenance institutions are in place. The second implication relates to how the new



Pic. 7.1



Pic. 7.2

Pic. 7.1: Upper part of the Ghatte Khola Pipeline. Pipes replace the old wooden pipes.

Pic. 7.2: But pipes also need maintenance, here has a landslide damaged the Ghatte Khola pipeline.

technology affects the management institutions. According to Agrawal (2001), rapid technology could affect the ability of sustained collective action, because it alters the needs of provision to the resource, and this might again alter the cost-benefit ratio of utilisation of the CPR. Ostrom also mentions this effect of new technology to a CPR (2000). The introduction of new technology to a CPR is therefore likely to call for a change in the management system. This might again require a period of adoption, trial and error learning (Agrawal 2001).

So what have been the consequences of the pipes in Manang and Ngawal? It is important to emphasise that in the case of these two villages, the modernisation that the pipes represent for the irrigation system does not replace other traditional means of water supply. It is an upgrading and addition to the existing water harvesting system. And regarding the drinking water, it means that it can be taken from taps in the village instead of from the irrigation canals. So the problems mentioned by Agrawal & Narain (1997) are not taking place in Manang and Ngawal.

But pipes need maintenance. Due to careless installation, the pipes in Manang often have a lot of damages after each winter (see pic 7.2). Maintenance of pipes does not fit into the traditional maintenance system. To repair a broken pipe requires some training and simple equipment. It does not require the effort of a lot of workers, but only of a few skilled ones. The Manangis have apparently solved a potential first order problem of collective action

regarding the maintenance of the pipes by paying workers instead of letting the maintenance be the responsibility of the entire user group. Still several informants complained about leakages in two of the three major irrigation pipelines in Manang, and the third, Ghatte Khola pipeline, was not in use at all due to massive damages. So the question is whether this system worked well enough. The drinking water pipelines in Manang were the responsibility of a technician employed by the district Drinking Water Office, and there were no complaints about this system. So also here a potential collective action problem was avoided, simply by avoiding a collective action solution to the maintenance.

Even if the pipes still represent challenges of maintenance, there is no doubt that the water situation in Manang is dramatically improved because of these pipes, and that the challenges connected to new technology that is mentioned in the literature (Agrawal 2001), are to a great extent coped with or avoided in Manang. Both social structures and social organisation changed as a response to the contextual changes.

In Ngawal, there was no institutionalised maintenance of pipes. The problems with the drinking water supply were described in section 5.2.3. The drinking water pipes were often malfunctioning due to lack of maintenance. If the drinking water system could have been maintained with a collective effort as with the irrigation canals, and not by an individual, it might have proved easier to organise. Thus the difficulties with maintenance of the drinking water could be said to be partly related to technology.

The ability to organise the maintenance of pipes seems apparently to be better in Manang than in Ngawal. The Manangis have solved a potential collective action problem for maintaining their irrigation pipes, while the Ngawalis have not achieved this for their drinking water pipes. Even if Manang due to its size is able to have a paid maintenance worker, the Ngawalis could easily have maintained their drinking water system themselves, without a hired technician. This was because the system was simple, and to clean the intake tank of leaves and pine needles really does not require skills or equipment. The factors that could help explain the weaker ability of collective action in Ngawal was discussed in section 6.2, and what I suggested there was the lack of leadership and heterogeneity in the community.

If the problems of maintenance are solved, there is no doubt that more pipes is the obvious solution to a better and more reliable water supply in both Ngawal and Manang. But in order for pipes to be a long term sustainable improvement of the water supply, appropriate management institutions must be in place. The solution chosen in Manang might also be what is needed in Ngawal. But the challenge is how they can raise the funds necessary to pay for the maintenance.

### 7.2.3 The local dialectics of migration in Upper Manang

In this chapter, the adaptations and changes that have occurred in the communities as responses to contextual changes, namely migration, will be reviewed and discussed by applying concepts from local dialectics.

The way the water supply in both Manang and Ngawal has been maintained is closely related to the agricultural, social and technological development in the villages. This development is closely related to the history of the people in Upper Manang in the 20<sup>th</sup> century.

Abandoned land and houses tell of a past with significantly higher farming activity than that at present. The seventies and eighties saw a widespread out migration from Upper Manang, due to business opportunities in Kathmandu and other major cities in South East Asia (van Spengen 1987). Then in the nineties, some villages in Upper Manang experienced return migration, due to stagnation in the business opportunities in Kathmandu and sharpening of visa policies all over South East Asia. Simultaneously the business opportunities in Upper Manang increased due to tourism. This out- and in-migration naturally had its effect on agriculture and irrigation. Until the out-migration started, the communities of Upper Manang applied a range of strategies in order to check the population growth. Similarly, there was a pressure on agriculture fields, and marginal, un-irrigated land was cultivated. Extensive irrigation systems were maintained. This was possible due to a sufficient supply of labourers. Then, in the late sixties, the out migration started. Houses and fields were abandoned as entire households migrated. Similarly, the traditions that made young men leave the villages prevailed. And during the eighties, modern family planning reached Upper Manang. The birth rates dropped. In the late nineties, the average family had three to five children, while they fifteen years earlier had around ten, according to local informants. Institutions and infrastructure, designed to serve a much larger community, deteriorated. In the late eighties and beginning of the nineties, lack of labour was suddenly a problem for maintaining the traditional agriculture (van Spengen 1987, Rogers 2004). This also included the irrigation system.

If applying concepts from local dialectics, as it is presented by Aase (1998), I would say that at one stage in history, the social structures that made young men leave the village, were the *thesis*. This *thesis* was legitimated by the need of population control. Then, at a later stage in history, the entire population decreased due to out-migration of households and drop in birth rates. This leads to labour shortage and also makes the irrigation system deteriorate. The social structures that make young men migrate are at this stage in history *antithetical* to



the social organisation of the farming system. But in Manang, this situation did not prevail. Introduction of plastic pipes reduced the need for labour to maintain the irrigation system. The return migration started in the nineties, and currently lack of labour was not perceived as a problem in Manang. In Ngawal, the development has been different. Ngawal faced the same out-migration as Manang. But they still face a situation of insufficient labour power, and there has not been the same degree of return migration. There has, on the other hand, been immigration mainly from the neighbouring Nar-Phu region and the more distant Dolpo. People from these places do not have status as native villages, and their presence makes the community more heterogenous, which was discussed in section 6.2.

Hence the immigration from neighbouring districts, the share of abandoned houses and land seemed higher in Ngawal than in Manang. In Ngawal, people also experienced lack of labourers to maintain the few existing wooden pipes in the irrigation system, and these pipes are being abandoned. As opposed to Manang, Ngawal has no significant return-migration of out-migrated villagers, and they have not been able to develop the irrigation infrastructure, in other words install piped water, that to a certain extent could have compensated for the lack of male labourers. These matters I discussed in chapter 6.2.

In Ngawal it is evident that social structures that make young men leave the village, has become an obstacle to the development of the irrigation infrastructure. This social structure was the *thesis* when out-migration was needed to sustain a livelihood for the remaining population. Under today's situation, it becomes the *antithesis* to the social organisation of the farming system. In Manang, this was met by modernisation of the irrigation system, by introducing several pipelines. The modernisation of the irrigation system was the result of the massive effort done by some of the returned villagers, who are resourceful, both in respect to wealth and initiative.

In Manang, the social organisation seems to have changed: Young men do not longer migrate. This is a response to contextual changes - the change in business opportunities, and not to changes in the social structures. The Manangis have shown that they are flexible in changing their social structures in respect to changes in social organisation. A social structure does not stay antithetical to the actual social organisation for long, before the social structures change, and turn into a synthesis. This tendency is displayed in how the Manangis have changed their irrigation management system, as described in chapter 5.2.2, as response to the changing demand from the irrigation system, which again was a result of the pipes and a smaller number of labourers. The legitimating principle for the social structures, the maintenance institutions, was to be found in the physical context, not in culture, and it was

therefore easy to change for the Manangis. When the social structures became an *antithesis* to the actual social organisation, they simply changed them.

The relationship between contextual changes and changes in social organisation and social structures has importance for how the communities are able to steward their water resources and displays that processes beyond that of collective action matters for the water management, and thus the water supply. It displays how contextual changes generate processes of local dialectics that influences on the water supply situation in the villages. The ability to sustain the water supply is thus not only a question of collective action, but of how contextual changes lead to changes in social organisation, social structures and perhaps culture. This last aspect I will discuss in the next section.

### **7.3 Religious practices and modernisation of the water system**

The higher the dependency on rain, the more the villagers in Upper Manang rely on prayers and rituals for rain and water in the streams. The role of religion for the different strategies for water supply is one of the research questions of this thesis. Religion is also a kind of a contextual factor to the water systems in the two villages, in the sense that it may influence on the water management without being an endogenous factor to the water system. In section 6.2.4 I discussed the importance of religion for the ability of collective action. This chapter addresses the dialectical relationship between contextual changes, water supply and religion.

The poorer the irrigation system, the higher is the dependency on rain, and the more the villagers pray. The dependency on rain has decreased in both Manang and Ngawal as a result of abandonment of unirrigated land, which again is a result of out-migration. In Manang, the dependency on rain has further decreased as a result of pipelines, especially the new Gyanchang Khola pipeline. But even with irrigation, the fields require rain if the harvest shall not fail. During the critical weeks around the sowing, people were frenetically praying for rain. In Ngawal the lama of the village performed the *puja* prescribed by the Tibetan Calendar, by spraying yak milk at particular source of water. The frequency of rituals connected to water thus reflects the vulnerability from lack of rain. But even if it seems like many farmers in Manang and Ngawal have faith in the effects of *pujas*, it does not mean that they put all their faith in prayers and rain instead of making an effort to get more irrigation pipelines. Even if more rain falls than expected, irrigation will still give higher yield.

As I wrote in chapter 5.3.4, one informant in Ngawal found that the villagers in



Pic. 7.3: Village women in Manang turning the prayer wheels during a *puja* in May 2004

Ngawal preferred to wait for the government to supply pipes, and pray for water in the mean time instead of making an effort trying to improve the irrigation and drinking water facilities. If this is the case, it is the only instance where religion is directly influencing the water supply, and it displays a fatalistic attitude towards the management of the water supply. This fatalism I will elaborate further in the conclusion, in section 8.1, as the discussion around this topic builds on the forthcoming analysis.

Culture can be viewed as systems of symbols, and the symbols assign meaning to the physical environment (Coward 1986). Through culture we relate to nature. In this sense also religion is a mode of adaptation to the environment, a way of prescribing meaning to events outside the control of human beings. The performance of religious rituals as *pujas* and prayers is a crucial part of the everyday life of most people in Upper Manang. Religion gives meaning to a lot of social structures and practices. The rituals for water are probably legitimated both in pragmatic strategies for sustaining a livelihood and for maintaining a religious identity, though in the mind of the Manangis, there is no such dualism. The *pujas* are performed if it is necessary. It is evident that some of the rituals for water are not being practiced if its purpose, like getting more water, is not needed. This suggests a clear pragmatic legitimating of at least

these rituals. Their meaning derives from need of water, not from religion. The practices of water rituals are generated by water needs and not by religion.

When pipes are installed, the frequency of water *pujas* and prayers goes down. The relationship is clear. In Manang, water *pujas* are rarely performed, while in Ngawal they are performed all the time. This shows how contextual changes like the introduction of pipes, changes the social organisation – in this case religious practices, and eventually the social structures. The question is if it also over time will change the culture.

## 8 Conclusion

This study has revealed how people in a remote corner of the Himalayas are able to sustain their water supply under a situation marked by climatic change, technological change and migration. I have tested the validity of a theoretical approach to CPR- management by applying the study of the water management in the two villages. Here is a summary of my most important findings:

- By comparing the water management institutions in Manang and Ngawal with Ostroms design principles, I have found out that the water management institutions are sustainable, but Manang copes far better than Ngawal due to different impact of the contextual changes.
- Contextual factors and changes affect the ability for the two villages to sustain their water supply: My observations and statements from my informants could indicate a *climatic change* to a drier climate, which would lead to more conflicts over water, more prayers and probably more pipes. *Technological change* in the form of pipes radically improves the water supply, given that they are followed by adequate management institutions. *Migration* has had different impact on the communities through history. Out-migration of men coupled with immigration from other districts weakens the ability of the villagers of Ngawal to undertake collective action tasks as installing pipes and maintain their drinking water system. Similarly do return-migration of businessmen to Manang supply this village with resourceful entrepreneurs, which have had an important role in getting pipes to this village (the contextual changes and their consequences for the water supply is outlined in section 8.1.1, 8.1.2 and 8.1.3).
- Based on my empirical findings I criticise Ostrom's CPR approach on its methodological individualism and neglect of contextual factors (outlined in section 8.2).

In this chapter I also bring in some new analytical elements from cultural theory that is derived from the empirical analysis I have done. This I do in the next section. In section 8.2.1 I also suggest a new model for CPR-research, based on my critique of Ostroms CPR approach and my empirical findings.

## 8.1 Coping with water supplies in the two villages

So why did Manang cope better than Ngawal with sustaining their water supply? As in Manang, did the irrigation management system of Ngawal meet most of the design principles, but the lack of obedience to the water sharing rules could indicate that the rules were not tailored to fit the resource attributes. Given a better water supply, the management institutions of Ngawal would probably also provide sustainable management. The irrigation management system in Ngawal was under constant pressure due to the continuing infringement of the appropriation rules. The system did not break down, but neither did it seem to change as a response to the pressure.

I would like to emphasize one difference between Manang and Ngawal; namely the more fatalistic attitude among the Ngawalis which I did not encounter in Manang. Thompson discusses in his cultural theory (1995) how fatalism relates to natural resource management. According to Thompson people tend to cope with uncertainties in the natural surroundings by socially constructed *myths of nature* that support their ways of life (Thompson 1995). According to Thompson, how people construct these myths can be deduced by “recurrent regularities within the managed ecosystems (...)“ (1995, 32). Thompson identifies four myths of nature: Nature as *perverse/tolerant*, *ephemeral*, *benign* and *capricious*. Each myth of nature is supported by a certain *way of life*: Hierarchic, egalitarian, individualist and fatalist (Thompson et al. 1990, Thompson 1995). A way of life is “a viable combination of cultural biases and social relations” (Thompson et al. 1990, 1). According to Thompson et al. (ibid) the myths of nature are provided by our institutions, and are thereby determined from our way of life.

- The hierarchist's myth is represented by aid agencies and governments. Thompson exemplifies this by the Food and Agriculture Organisation, FAO. The hierarchist view nature as *perverse/tolerant*, and advocates hierarchical structures for resource management.
- The egalitarian's myth is represented by deep ecologists, who ascribe moral subjectivity to nature. The egalitarians view nature as *ephemeral*. Human impact on nature might therefore have unpredictable and disastrous consequences.
- The individualist's myth is represented by the radical market-oriented economist Lord Bauer. The individualists view nature as *benign*, and do therefore advocate a resource management where all individuals should be allowed to exploit nature for their own benefit without any regulation imposed by hierarchical institutions.

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- The fatalist's myth is represented by the hill farmers of Himalaya. The fatalists view nature as *capricious*. They know that anything can happen; their resource situation can get worse or better. Nothing the farmer does can influence upon this situation, and to try to improve that situation is therefore meaningless.

In cases where the state of the world is uncertain, the supporters of each way of life tend to choose the state that supports their myths of nature. Where the egalitarian sees *natural resources*, the individualists see *raw materials*.

The farmers in Ngawal seem to support the fatalist myth. To pray for rain or appeal to the government for pipes is part of the same logic. Events - be it rain or installation of pipes, is not under the control of the Ngawali farmers, but by remote powers; gods and the government. To try to improve their water situation by improving the existing canals is meaningless. Next rainfall will make landslides destroying the canals anyway.

The entrepreneurs in Manang on the other hand support the individualist myth of nature. Nature is seen as benign, with abundance of resources. The task is just to get optimal utilisation. There are enough water resources available, the task is just to be able to utilize it. In the case of Manang this means installing pipes.

But could not the fatalist myth among the Ngawalis and the individualistic myth among the Manangis be said to be dependent on partly the same contextual factors that I have examined in this thesis? Before I discuss this I will first give a short summary of how I found the contextual changes to influence the communities and their ability to sustain their water supply.

### **8.1.1 Climatic change – the answer is pipes**

The fear that the rapid shrinking of the glaciers in the Himalayas will dry up some of the most important rivers in the world as well as the communities dependent upon their water, is part of the backdrop of this thesis.

According to local informants, the climate in Upper Manang has become drier the last years. I observed a higher snowline and retreating glaciers, and my informants told about less snow in winter and less water in the streams. But the most critical variables for water for irrigation were the snowmelt and precipitation during the spring, according to the local informants. I also wanted to look at the social consequences of a drier climate. The situation in Ngawal gave a clue to what would occur: Fighting and frequent rule breaking. These are changes in social organisation. In Ngawal I did not reveal any changes in social structures. As mentioned did the irrigation management institution in Ngawal stay unchanged despite the

prevailing rule infringement. A more thorough investigation of what happens to resource management institutions under pressure is thus a question for further research.

But if pipes are seen as a response to a drier climate, it is evident that institutional changes, or changes in the social structure, are likely to take place. This is the topic of the next section.

### **8.1.2 Technological change – challenge and solution**

Technological change in the form of pipes is the most important way of improving the water supply situation in Manang and Ngawal.

The introduction of pipes has social and cultural consequences for the communities. In Manang, the farmers had successfully changed the irrigation maintenance system partly as a response to the introduction of pipes, and thus it can be held that the pipes had consequences both for the social organisation and social structure, while the villagers of Ngawal were not able to organize maintenance of the drinking water pipes, or get more irrigation pipes installed.

In Manang, the frequency of prayers and *pujas* for water has declined as the water supply has been improved by pipes.

To install more pipes is an obvious way for improving the water supply of the villages in Upper Manang, and the most important strategy for the farmers to cope with a drier climate. But without adequate institutions for maintenance, the pipes surely will deteriorate and the entire effort will be worthless.

### **8.1.3 Migration**

Both historically and at present migration has had great influence on the water system in Manang and Ngawal. Permanent out-migration frees irrigated land and makes more water available for the households who remain in the village. But permanent out-migration of households and trade migration deprive the communities of labour. During the eighties, the irrigation system deteriorated due to lack of labour (van Spengen 1987). In Manang, the return migration through the latter half of the nineties, had again made the village well supplied with labour, and the introduction of pipes has reduced the need of labour for maintenance. In Ngawal, male labour is still scarce, and parts of the irrigation system continue to deteriorate. Both Ngawal and Manang experienced immigration from other districts and neighbouring areas. This immigration has made Ngawal more ethnically heterogeneous than Manang, and it might help explain why the Ngawalis have not been able



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to improve their water supply and why they are not able to maintain their drinking water system.

In order to analyse how migration influences the social organisation and the social structures in the villages, and how these changes again influenced the farming system in general and the water system in particular, I applied the method of local dialectics. It demonstrated how the changes have occurred through a dialectical process between social organisation and social structures, most notably between the cause and effects of migration to the communities, which again had its effects on the water supply. In one stage of the history of Upper Manang, migration of young men was a necessity to sustain living – it was the *thesis* in my analysis. But when the population dropped, the social structures that made young men migrate lead to deterioration of the water systems due to lack of labour. The same social structures then becomes *antithetical* to the actual social organisation. In Manang people confronted the lack of labour by installing pipes and by changing the irrigation management system; the social structures changed.

By applying local dialectics I have shown that to study the ability of farmers in a mountain community to sustain the water supply is not only a question of collective action, but also a question of how contextual changes lead to changes in social organisation, social structures and perhaps culture. To sum up the discussion of my second theoretical research question, local dialectics proved useful for studying the effects of migration on the water supply, by providing the methodology and concepts that extended the perspective beyond that of the CPR approach.

### **8.1.4 The contextual factors and the myths of nature**

The Manangis do not display a fatalistic attitude towards natural resource management, but rather an individualistic one. This I ascribe to the presence of the entrepreneurs, the return-migrated business men of Manang, which attitude seems more to be that of an individualist in Thompson's term (1995). Similarly might the ethnic heterogeneity and the fact that “just women and the poor are left”, as one Ngawali farmer put it, help explain the fatalistic attitude in Ngawal. The fatalistic attitude might derive from the fact that the Ngawalis are not able to get anything done; no pipes and no drinking water management.

The contextual change that first and foremost has influenced this difference in way of life and myth of nature is migration, as described and discussed in section 2.2.4, 7.2.3 and in the previous section. This suggests that the way of life and myth of nature held by different groups not necessarily is determined from internal properties of a group, as Thompson seems

to presume (1995), but is dependent on the space and time context that their resource management occurs within. The Manangis could as well have held the fatalist's myth of nature in the eighties, before the return migration started, and poor Manangi farmers might very well still have a fatalist way of life.

A question for further research could be to conduct a more thorough study of the different village's myth of nature, how these myths are constructed and how they are articulated in the natural resource management in the villages.

In the next section I will introduce my own model for research on CPR management, that can also be seen as a way to reveal how the myth of nature held by CPR managers are constructed.

## **8.2 Theoretical implications**

I have based most of the analysis in this thesis on Ostrom's CPR framework. It proved to be useful for conceptualising the water management, for analysing the water management institutions in the two villages and to highlight different factors that can help explain the differences in how the two villages ability to sustain their water supply. But I found two problems with applying Ostrom's framework:

- The first relates to its methodological individualism, which makes it overlook the importance of social structures and culture for the villager's ability to change or craft CPR management institutions.
- The second problem relates to its neglect of contextual factors.

### **8.2.1 An integrated approach**

Besides the need of a CPR approach that includes social structures and culture, the question is how contextual factor could be included in an analysis of CPR systems, without having to make an endless list of internal and contextual factors. Theoretical models simplify the reality in order to help us understand it. When levels of details are too high, the models get too complicated to help in this understanding. If the models then should be made useful, the level of abstraction must be higher. There is a need of a CPR framework at a higher level of abstraction that still can guide research. This framework should also take a perspective that recognizes the power of social structures and culture in enabling and constraining social processes and thereby the management of CPRs and the evolution of CPR management institutions. I find it useful to keep Ostrom's distinction between analysis of institutions for

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CPR management and analysis of the CPR appropriators ability to craft and change management institutions. In this study, I first and foremost found that it was the latter that needed to be presented in a more abstract manner. I have made one suggestion, fig. 8.1, which is an attempt to apply the insights I have gained through the studies in Upper Manang to make

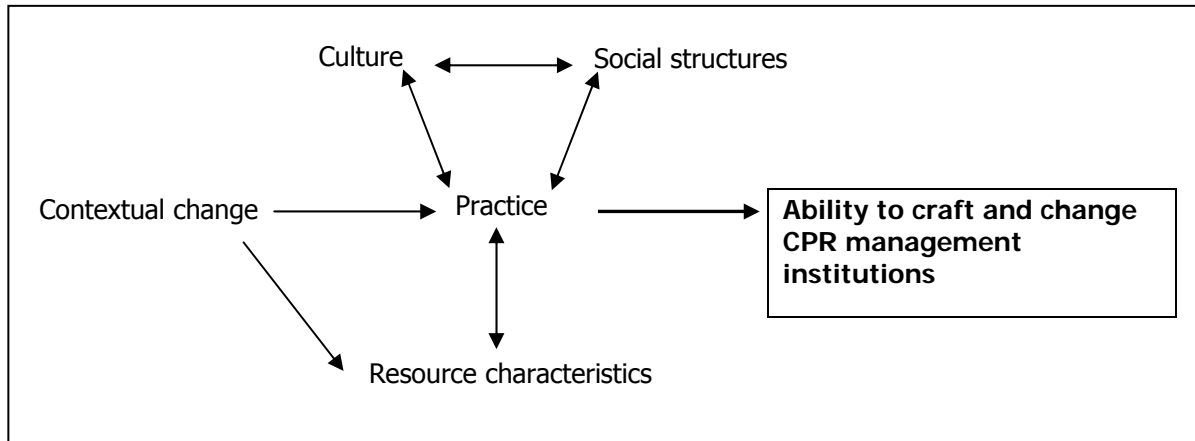


Fig. 8.1: The relationships between the factors that influences on CPR appropriators ability to craft or change CPR management institutions.

a general model that includes social structures and culture as well as context.

In the entity *social structures* I include institutions (inclusive CPR management institutions) and norms. *Practice* refers to the acts and intentions of individuals, and corresponds to Aase's concept *social organisation*. This entity includes the actual resource use and management, as well as cost – benefit evaluations that an individual undertakes when deciding to comply or not to the CPR management rules. *Individual choice* is thereby included in this entity. This is why I have chosen to term this entity *practice* and not *social organisation*. *Resource characteristics* are attributes of the resource like size and regularity. The arrows indicate the flow of influence. Arrows in both directions between entities suggest a dialectic relationship. Local dialectics are displayed as arrows in both directions between *practice*, *social structures* and *culture*. The *resource characteristics* affect the management as the management may influence on the *resource characteristics*. For instance will over-use affect the resource size. *Contextual change*, like technological change, affects *practices* like maintenance of the irrigation system in Manang, which again results in changes of the maintenance institutions - *social structures*. The core variable in the model, *ability to change or craft CPR management institutions*, is *practice*, and is thereby enabled and constrained by *social structures*, *culture* and the *resource characteristics*. Under the various aspects in the model, known factors and variables, like the design principles and the factors found to influence on collective action that are mentioned in this thesis, can be included. The challenge

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is to include the context. How to know which contextual factors to look for? Each case study would need a careful examination of which contextual factors might have importance. Just because they are not explicitly identified in a theoretical model, it does not mean that they should be left out from the research.

I contend that this model also could help explain the myth of nature held by the CPR managers. The triangle *practice-social structure-culture* can be seen as a representation of Thompspons concept of *way of life*. The myth of nature manifests itself in the resource management (practices), in the management institutions (social structures), and in the values and beliefs that legitimates these (culture), and thereby it reflects the way of life. The model thus displays how the myth of nature, as well as way of life, are influenced and changed by contextual changes.

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## Appendix

### Questionnaire for Household survey

- 1) Number of household members in your household?
- 2) Number of household members living outside the Manang District
  - a. Number of females?
  - b. Number of male?
- 3) Other kind of occupation besides farming (Y/N)?
- 4) Have you experienced problems with getting enough irrigation the last five years (Y/N)?
- 5) Have you experienced getting a bad harvest due to lack of irrigation the last five years (Y/N)?
- 6) Have you been involved in fight over irrigation the last five years (Y/N)?
- 7) Are you satisfied with the irrigation management system (Y/N)?

## Glossary

English	Nepali	Nyesheng
<b>Agriculture</b>		
Barley		Kahru
Beer	Shying	
Buckwheat		Kepra
Canal		Kyur
Liquor	Raksi	Ara
Potatoes	Alo	
Porridge flour		Tsampa
River, Stream	Khola	Kyu
Water		Kyu
Wheat		Shou
<b>Social structures and culture</b>		
Advisor to the village Headman		Falasing
Cairn		Chorten
Figure made of wheat flour and yak butter for ritual purposes		Tormo
Monastry		Gompa
Religious ritual		Puja
Tradition	Parampara	
Vice village headman		Lensing
Village headman (now VDC chairman)		Khamba
Village meeting		Panch Chong
White stranger		Filing

## **Abbreviations**

ACA	Annapurna Conservation Area
ACAP	Annapurna Conservation Area Project
AMIS	Agency Managed Irrigation System
CPR	Common Property Resource
DAO	District Agriculture Office
DSDWS	District Sanitation and Drinking Water Sub-Office
FAO	Food and Agriculture Organisation
FMIS	Farmer Managed Irrigation System
HMK	His Majesty the King
IPCC	International Panel on Climate Change
ICSI	International Commission on Snow and Ice
NGO	Non Governmental Organisation
NRS	Nepali Rupees
VDC	Village Development Committee
VCDC	Village Conservation and Development Committee