



# Farmer's Adaptation to Global Warming in Punjab

By

Torill Keys

Master Thesis in Human Geography  
Department of Geography, University of Bergen  
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Would I do it again?

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Bergen, May 2011  
Torill Keys

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## Abbreviations

UN	- United Nations
IPCC	- Intergovernmental Panel for Climate Change
CGWB	- Central Ground Water Board
Rs/Rp	- Rupees (In this thesis I refer to Indian rupees)
CED	- Centre for Education and Documentation
AME	- Agriculture, Man, Ecology (An NGO)
NGO	- Non-Governmental Organization
SAD	- Shiromani Akali Dal. Militant, nationalistic, religious political organization
FSR	- Farming Systems Research
GMO	- Genetically Modified Organism
PAU	- Punjab Agricultural University
MSP	- Minimum Support Price
Mham	- Million hectare meters
U.P	- Uttar Pradesh
C.S	- Co-operative Society

## Punjabi terms

<i>Punjab</i>	- From the Persian; Punj- five, ab- water. Hence, the five rivers (Land of the five rivers)
<i>Varna</i>	- Means “colour”, sometimes used instead of the word “caste”. The caste system is divided into four main varnas (divisions).
<i>Jati</i>	- A word for “caste”
<i>Jati (caste) panchayat.</i>	– Village counsel that consists of caste elders and may perform Judicial functions, settle cases of violations of caste norms and Rules and dispense punishments.
<i>Brahim</i>	- Highest caste. Priests and custodians of sacred knowledge
<i>Kshatriyas</i>	- Second of the four main varnas. Warriors and rulers
<i>Vaishyas</i>	- Third of the four varnas. Traders and farmers
<i>Sudras</i>	- Fourth of the varnas. People who perform manual labour
<i>Jaat</i>	- Agriculturalist caste of the third varna
<i>Makhans</i>	- (A caste) Shops owners and house builders
<i>Naii</i>	- (A caste) Barbers

<i>Dharga</i>	- (A caste) Sellers of clothes
<i>Johr</i>	- (A caste) Cook and prepare food
<i>Harijan</i>	- “Child of god”, a name Gandhi gave the casteless. Harijans are also called Dalits. Harijans used to be called Chamars which means “work with leather”. Makers of dung cakes and cleaners (often sewers)
<i>Rajput</i>	- Prominent landowning clan
<i>Gill</i>	- A Jaat clan
<i>Arhtias</i>	- Commission agents and money lenders.
<i>Gurudwara</i>	- Sikh temple
<i>Karma</i>	- The belief that one`s actions are responsible for one`s suffering
<i>Pind Panchayat</i>	- Village council (Elected and/or the traditional panchayat)
<i>Sarphanc</i>	- Leader of the Panchayat
<i>Patwari</i>	- Land record office
<i>Killa</i>	- Measurement of land. One killa equals one acre
<i>Berseem</i>	- A clover-like plant used for fodder
<i>Mong Daal</i>	- A type of lentil
<i>Roti</i>	- A wheat and water based pancake
<i>Ghee</i>	- Butter made from buffaloes milk
<i>Daal</i>	- Food made from lentils
<i>Saag</i>	- Food made from mustard
<i>Curd</i>	- Milk product
<i>Lassi</i>	- Milk product (refreshing drink)
<i>Kisan Mela</i>	- Farmers fare
<i>Mandi</i>	- Market
<i>Tella</i>	- Bugs
<i>Kharif</i>	- Refer to cultivation of kharif crops during the monsoon season
<i>Rabi</i>	- Refer to cultivation of rabi crops in the dry season Oct-May
<i>Barani</i>	- Rainfed (land)
<i>Sanchai</i>	- Irrigated (land)
<i>Izzat</i>	- A concept of honour

## **Pakistani terms**

Gheirat	- A concept of honour
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*”To become accustomed to anything is a terrible  
thing.”*

Japanese Zen master to Bateson (2000)

## Chapter 1: Introduction

*“... climate and changes related to climate make farmers flexible, we have to be flexible. But at the same time farmers cannot be flexible because we have to make money and that means that we have to use water”.*

(Akalbir (56), farmer and director of the Co-operation society in “Pind”)

The UN has stated that we are all responsible for global warming, and that unless measures are taken to prevent further negative human impact on the environment, there will be serious consequences. Future scenarios of famines caused by extreme weather and global climatic change, climate refugees and the loss of biodiversity have been among the presented scenarios. Although this point of view is considered to be a orthodoxy, it is important to keep in mind that it is difficult to predict the future. The world has always needed to cope with variability in weather conditions and the possibility of famines caused by heavy rain, droughts or floods is something that we know will occur from time to time.

However, in our modern age it seems evident that global warming and a global climatic shift have come upon us at a speed and range never before seen by humans, and the Earth has not experienced higher temperatures since the time of the dinosaurs (Salick and Byg. 2007). The industrialization of the global north has accelerated the natural climatic shifts to extreme levels, and the world society agrees that the green house gasses that are spread into the atmosphere must be reduced in order to prevent, or at least reduce, what can become devastating consequences. However, it seems that the world leaders may be failing in their attempt to put an end to global warming. The agreed goal of hindering the average increase in temperature to rise beyond 2 degrees Celsius seems to be out of reach and it seems to be a case of too little too late.

The global warming discourse has mainly focused on how to prevent global warming by trying to pin-point which countries should take most of the responsibility to stop or reduce the possible effects of global warming. We need to make sure that we not only continue to try to prevent further human impacts on the environmental system, but that we also focus on our ability to cope with the possible future impacts of global warming. To do this we will need to

be flexible in order to be able to adapt to the situations that will ultimately arise and that will have to be dealt with.

One major aspect of this is the issue of food security and the survival of farmers. But how will farmers respond to the future changes?

Aase (et al 2009) writes that 1.3 billion people in Asia depend on the Himalaya Mountains for water. This dependence, on what throughout history has proven to be a reliable and renewable resource, can come to have serious consequences since it is now said that this water is on the verge of being reduced dramatically due to the temperature increase expected this century that will reduce the glaciers by two thirds. This of course is a huge threat to the future of farming on the plains since the farmers are dependent on the Himalayan Rivers for water. In addition there is great concern that the Green Revolution's technology, which is very dependent on water, may further aggravate food shortage problems. An estimate of Indian agriculture has been presented and indicates a staggering 30 percent reduction by 2080 because of the country's dependence on the Green Revolution technology (Cline, 2008).

Aase (et al 2009) points out that when it comes to estimates like these, one must have in mind the limitations such regional estimates have when their purpose is to analyze future farming on a local level. And since one has yet to create good local climate models, one must instead put one's faith in investigating local farming systems and their potential to adapt to changes.

The question regarding flexibility is however complex, and must undeniably be affected by people's perception of risk and social limitations to adaptation. A prerequisite for a successful implementation of adaptation strategies into the real world is that these limits are recognized as part of the adaptation debate.

Agder (et al 2008, p. 349) points out that there are social limits to adaptation to climate change. Stating that, "...societal adaptation is not necessarily limited by exogenous forces put outside its control. More often, adaptation to climate change is limited by values, perceptions, processes, and power structures within society. What may be a limit in one society may not be in another, depending on the ethical standpoint, the emphasis placed on scientific projections, the risk perceptions of the society, and the extent to which places and cultures are valued"

I concur with this view. When looking closely at adaption, or flexibility, one can see that there are several issues that one needs to be aware of when, for instance, proposing a law or suggesting agricultural subsidy with the intent of raising farmers' adaptation capacity. If one is ignorant of the interconnectivity of the farmer's identity and his work, one might soon experience that the intent of the proposed bill will fail miserably when out in the real world.

Also actions the farmers themselves could have taken in order to adapt might not be taken because of their cultural baggage. And so when, for instance, looking closely at the wheat/rice cropping system of Punjab and attempting to recognize the farmers' potential to adapt to changes, one should also be aware of the farmers' heritage, beliefs, and quite simply, cultural baggage, and ask oneself what is most important to the farmer. By doing this we will then get a better sense of which flexibility strategy is likely to be taken by farmers sharing the same cultural baggage. The farmer will be illuminating his "tolerance limit" so to speak, with regard to how far one can stretch the adaption strategy and which direction one should take when trying to find a suitable adaption path.

In this thesis I not only look at the farming strategy of the locals, I also try to identify the farmer's cultural preferences that might limit or perhaps promote flexibility when making decisions on agriculture. This does not mean that I do not recognize that in a high yielding farming environment like Punjab, farmers are naturally very much guided by governmental incentives and economical returns. But I would claim that these issues are also adapted and, if needed and if possible, changed in accordance with the farmers' preference.

### **1.1 Research questions**

The main objective of this study is to explore the Punjabi farmers' potential to adapt to change. To be able to explore this potential I will not only map the farming system, but also the cultural system of the farmers.

So, the main question that I will try to find an answer to is:

- What are the farmers of a Punjabi village's potential to adapt to changing production conditions?

- A sub-question that I shall also try to find an answer to is What role does the cultural system of a Punjabi village have on agriculture, and how can it affect farmers' potential to adapt to change?

This Master thesis is part of a research program on 'Farming Flexibility under Conditions of Climatic- and Market Uncertainty', led by Professor Tor Halfdan Aase at the Department of Geography, University of Bergen. Relevant to this, Aase has, with fellow scholars, conducted research in Manang, Nepal Himalaya (2009), where they have explored farming flexibility and food security under climatic uncertainty. I will therefore end the thesis by comparing a Punjabi village with Manang.

## **1.2 What changes?**

The main objective of the thesis is to explore farmer's potential to adapt to changes. But what do I mean by "changes"?

As stated earlier, one change is the issue regarding the reduction of the rivers that are fed by the Himalayan system. Another issue is that, according to the Third Assessment Report from the Intergovernmental Panel on Climate Change (IPCC), the average mean-temperature in Asia is expected to rise 3 degrees Celsius in 2050 and after that 5 degrees Celsius (IPCC 2007). An increase in area-averaged annual mean rainfall over Asia has also been projected. The rise in the monsoon rainfall pattern will probably result in floods, but the changes in rainfall will also entail possible droughts which will be exacerbated by the reduced river streams. Extreme weather variability is also likely to be part of the future. However, variable weather conditions will prove to be difficult to manage in this thesis, so it would therefore be wise to focus my efforts on changes that are more "predictable", so to speak.

Thus, when referring to "change", I refer to the issue regarding the reduction of river flow which will ultimately also affect the groundwater of the plains. The issue regarding increased temperature and increasing annual mean rainfall is also kept in mind when attempting to reach a conclusion regarding the issue of farmers' potential for change.

So the future scenario, which is the change we are adapting to, is: Rising temperature leading to the reduction of glaciers that will first lead to more river discharge and then to the rivers



discharge inevitably being reduced. More expected precipitation during monsoon season might serve to remedy the water shortage for a time, but will also be a threat to agriculture that might then be faced with the threat of floods. As the farmers know from experience, higher temperature will lead to an increase in pests and plant sickness, and this will thus also become a greater problem for farmers.

The higher temperature, reduced supply of water and a monsoon that will periodically provide more rainfall will all change the conditions for farm production. Certain plant species may not be able to adapt and some animal species might disappear altogether, leaving cultivable crops vulnerable to increasing bug populations that thrive in the hot conditions in an environment that might no longer have sufficient animals to hold their population down.

The high temperatures might make the area's dormant period for deciduous trees and grasses during the hot season last longer. Important to note here, as stated by Chapman (1995), is that during the winter and the hot months evapotranspiration exceeds precipitation. The effect of these climatic conditions is that vegetation only will grow during these two seasons if temperatures are not too high and there is enough soil moisture and that irrigation is provided.

Some of the environment of Punjab might become arid and dry most of the year, as was the case before the channel system was developed.

However, as mentioned above, the future is as always uncertain, hence as Aase (et al 2009 p.2) states. "Lacking reliable models of future climates at local level, the best we can do is to focus on the flexibility of local farming systems in terms of adaptability to changing conditions of production, whatever those changes may turn out to be".

### **1.3 Climate, agriculture and flexibility**

"Humanity has been at the mercy of climate change for its entire existence. Infinitely ingenious, we have lived through at least eight, perhaps nine, glacial episodes in the past 730 000 years. Our ancestors adapted to the universal but irregular global warming since the end of the Ice Age with dazzling opportunism. They developed strategies for surviving harsh drought cycles, decades of heavy rainfall or unaccustomed cold; adopted agriculture and stock-raising, which revolutionized human life; founded the world's first preindustrial

civilizations in Egypt, Mesopotamia, and the Americas. The price of sudden climate change, in famine, disease, and suffering, was often high” (Fagan. 2000. *preface*).

I was so fortunate as to attend the International Climate Change summit 5<sup>th</sup> -7<sup>th</sup> of February 2010 in New Delhi. The intention of the summit was to explore new pathways to sustainable development, and move beyond the Copenhagen summit which had taken place months before with disappointing results. The many speakers ranged from world leaders, highly admired scholars, Nobel Prize winners and some farmers. But there seemed to be a majority of people who had economical interests concerning the global warming issue present.

Although presumably attempting to get farmers to become active participants in the ongoing debate, my heart sank as I watched one farmer speak to the audience. In his native language he attempted to display his difficult situation, as tears ran down his face. It was not possible to grasp his message, and sadly I recognized a feeling of helplessness growing in me.

Surrounded by the spectacular richness of the Taj Palace where the exhibition was held, consuming small canapés with exclusive ingredients and splendid food, the scene seemed to me somewhat grotesque. I could not rid myself of the feeling that the farmer had in some way been on display and used as a tool to secure money transfer and investments. My hopes are that the farmer was at least welcomed as an equal in the debates that went on behind closed doors, because in the debates that we spectators were allowed to witness, the farmers who had been summoned to the summit did not attend.

I do recognize and duly accept that in order to reduce and even rid ourselves of the emissions that are leading us towards climatic change we need to change the economical path in which industrialization has guided us. The dawn of a new “green” economy is needed and welcomed. But what measures need to be taken in the sense of adaptability? What would be wise investments? And where would investment best be placed geographically?

Although the issue regarding adaption was on the agenda in New Delhi, the debate remained surprisingly superficial, tame and unfocused.

#### **1.4 The Himalayan issue**

Aase (et al 2009, p. 2) refers to Thuiller (2007) when pointing out that the rise in temperature will lead to: “plant species may have to migrate north by some 500 kilometers or upwards by 500 meters in order to find a suitable biotope”. Further the scholars refer to the Geological

Survey of India (1999) when continuing, stating that: “the line of snow accumulation will rise from its current 5700 meters above sea level (masl) to 6300 masl, which implies that two-thirds of the glaciated area of the Himalayas will vanish”.

Naturally these predictions will not only have major effects on the farmers on the plains, but will also have implications on the farming communities in the mountains should these predictions prove to be true. Aase (et al 2009) refers to FAO (1997), Adhikari and Bohle (1998), Blaikie (et al 2001) and Jodha (2005), when pointing out that the Himalayan environment has been described as fragile for decades. Opposing works are represented by Tompson and Warburton (1985), Ives and Messerly (1989), Ives (2004), Vetaas and Knudsen (2004) and Dr. Gurung (2004) who strongly believed the mountains to be highly dynamic. Surely the work of Holmelin (2010) who has contributed to professor Aase`s research program also confirms this.

Holmenlin (2010) and Aase (et al, 2009) have explored the traditional farming of the Himalayas. Naturally the conditions on the plains are quite different from the farming system of the mountains that have remained quite untouched by chemical fertilizers and such like. Curiously the environmental issue on the plain which has come as a direct result of the Green Revolution inputs has been recognized, but has not led anyone to define the plain environment as fragile or un-dynamic. Considering the current state of the plains it will be quite interesting to compare the two different environments at the end of the thesis.

### **1.5 Structure of the thesis**

Chapter 2. In this chapter the reader will be familiarized with the climate, economy and agriculture of India. The reader will also be presented with the caste system and get a closer look at Punjab`s agriculture.

Chapter 3. Concerns the many challenges faced in the process of fieldwork and data collecting. The reader will also get a glimpse into the life in a Punjabi village.

Chapter 4. Here the theoretical framework for the thesis is stated. The epistemological basis for the thesis is presented first before going on to introducing Turner and Brushes farming

systems approach (1987) and the cultural information system of Leaf (1987). Since Punjab can be characterised as a green revolution state, two Green Revolution narratives are introduced. Bateson`s concept of flexibility is presented as this thesis` understanding of flexibility. The chapter ends as it begins, with the realist epistemology.

Chapter 5. The chapter is mainly dedicated to presenting the findings but begins by addressing data production before going on to introduce the village. In order for the research to be suitable for future reference, the basis for comparison is secured by classifying the farming system of the village according to Turner and Brushes classification system (1987) presented in chapter 4. The village`s agricultural calendar is mapped before moving on to the findings relevant to the cultural system and the findings relevant to the farming system of the village.

Chapter 6. This sums up of the findings in chapter 5. By applying these into Bateson`s system of flexibility the current flexible agricultural environment of the village is stated. The path dependency created both by exogenous forces as well as the village`s cultural system and the blame-game that these dependencies have created, are recognized. The recognized potentials advised through Bateson`s system of flexibility as well as the cultural constraints and other constraints that affects these, are forwarded. The chapter ends in a comparison between a Punjabi village and Manang.

Chapter 7. This focuses on providing a brief review and conclusion regarding the answers to the research questions. This chapter is based on chapter 6.

## Chapter 2. Geographic setting

In this chapter I will present the general setting of my thesis. The reader will be familiarised with Pind, the village where the fieldwork was conducted in chapter 5.

### 2.1 India

India constitutes 28 states and 7 union territories and has the second largest population in the world estimated to reach almost 1.2 billion by July 2011 (CIA 2011). India ranges from the famous and mystical snow-covered Himalayan Mountains in the north, via the dry, brown plain and sandy deserts, to the tropical rain forests of the south. This highly ecologically diverse unit is embraced by the sea; the Indian Ocean between the Bay of Bengal on the east



Map 2.1: India and the state of Punjab

and the Arabian Sea on the west. According to Baxter, et al. (1998), the Indian mainland comprises three main regions, each with its own culture, traditions and history. The three regions are, the Deccan plateau, the South (land of the Tamils and the Dravidian people) and the vast plains of north India, irrigated by Indus, Brahmaputra, the great Ganges River and their tributaries. The rivers bring high fertility to the north of India with their silt deposits, making agriculture the main source of livelihood for the

population (Ibid). The plains are among the most densely populated areas on earth and are one of the world's largest stretches of flat alluvium, formed by basins of the three distinct river systems.

According to Baxter, the Indian population is mostly agrarian, and in 1998 Baxter and his fellow authors stated that as much as 80 percent of India's population relied on agriculture for a living. Most of the Indian inhabitants are still dependent on agriculture for a living, despite the huge economic development India has experienced that has made it one of the world's emerging leaders in knowledge based industry. However, agriculture only comprises 16 percent of GDP in 2010 as opposed to industry 28.6% and services 55.3% respectively (CIA 2011)



Map 2.2: The Indo-Gangetic plain

### 2.1.1 Climate

The distinct feature for the area is the monsoon. India's climate is affected by two seasonal winds – the advancing winds of June to September, which bring heavy rain, and the retreating monsoon of October and November. The advancing monsoon carries a

very heavy moisture load, while the retreating monsoon comes from the landmass, and has very little moisture (Chapman. 1995. p.9). In general there is a very heavy precipitation on the mountain fronts, lesser precipitation in the catchments beyond and very much precipitation in Bengal and lesser and more unreliable precipitation the further north and west one moves from east to west of the Indo-Gangetic plains. The difference in the length of precipitation during a year from east to west is quite astonishing, the east experiencing five months of expected rains while the west experiences three months (Ibid, p.11).

Chapman states that it is usual to think of the year as having three climatic seasons: The monsoon, which is the rainy season, winter which is the cold season, and lastly the hot season. The monsoon season is when kharif crops like paddy are grown. The winter season is when the nights get cold and the days are pleasantly warm. In the winter season rabi crops such as wheat are grown. The hot season, reaches its peak around May-June, with temperatures in the western part of the plain reaching as high as 46 degrees Celsius (Ibid. p,11).

As Chapman points out, the low humidity and the high temperature makes the potential evapotranspiration extremely high. Due to the high temperatures the area's dormant period for deciduous trees and grasses is during the hot season. The effect of these climatic conditions is that vegetation only will grow during these two seasons if temperatures are not too high, and there is enough water provided.

### 2.1.2 Economy

India has experienced an enormous economical development and the country's economic growth has averaged more than 7% per year since 1997 (CIA 2011). India's

economy is highly diverse and includes everything from exports of information technology services and software workers, to traditional village farming and modern agriculture. More than half of the work force is in agriculture, but services are the major source of economic growth.

In 2010, the Indian economy proved robust when challenged by the global financial crisis, but high food prices, resulting from the combined effects of the weak 2009 monsoon and inefficiencies in the government's food distribution system, fueled inflation.

In 2010 the national government had to take action in order to lower the government's deficit. Measures that were taken were among other things to reduce subsidies for fuel and fertilizers (Ibid).

#### **2.1.4 Agriculture**

According to the web site of the CED (Centre for Education and Documentation) agriculture was given a key position in the development of the post colonial India. The perceived view was that India was experiencing a food-crisis. The reason for the perceived food-crisis has been said to be everything from a growing population to, as stated by Dr. R. Dwarakinath, chairperson of the AME (Agriculture, Man, Ecology) an NGO in India, referred to by the CED, that the loss of Punjab meant a loss of wheat supply and that the British loss of Burma meant a loss of rice supply. The fact that both the British and the Indian people were emerging from the devastations of the Second World War was also a factor that prompted the Indian government into instituting a program called "Grow more food campaign".

After centuries under colonial rule India was also eager to become independent and wanted, among other things, to reduce its dependence on foreign food imports. It also searched for a means to achieve industrial growth, and so the "Green Revolution", with its chemical fertilizers, pesticides, mechanised agriculture and high yielding variety seeds, was embraced as the tool that would enable the country to reach these goals (Ibid).

However, the Indian incentives for moving away from imperialist power can be debated as the Rockefeller Foundation's scientists argued for the need of an Indian move into the world of Green Revolution due to what they perceived to be India's path-dependency on traditional agriculture. The Ford Foundation was also heavily involved in the implementation of the new technology into India, and the U.S. Government under Lyndon Johnson implemented foreign

aid programs into India as a means of forcing the country out of what they perceived to be an economic stagnation (Goldsmith, 1988).

The new intensive agriculture was implemented and directed into areas with good water resources and infrastructure in order to reach satisfactory production potential that would give profit (CED). The great Punjab was one of the areas that welcomed the new technology. The irrigation system as well as the good fertile soil seemed to be perfect for the dawn of a revolution in food production. Between 1965-66 and 1970-71 the wheat yield per hectare in Punjab doubled, from 1104 kg/ha to 2238 kg/ha (Ibid). By 1984, 1.8 m ha and 2.8 m ha had been brought under paddy and wheat (Ibid). Due to credits, subsidies for energy and agricultural input, and a growth in the minimum support price for certain grains, as well as the policy that supplied free electricity to farmers, the growth of paddy and wheat fields continued.

Today Punjab is experiencing stagnation in the food production. The available technology and the environmental conditions indicate that production capacity has reached its limit, and has become unsustainable and non-profitable, with the farmers experiencing higher costs in their food-production that diminish returns (CED).

### **2.1.5 Caste**

According to Baxter (et al.1998) The Aryan tribes from the northwest penetrated the Indian subcontinent around 1500 B.C. The Aryans, described as nomadic, fair skinned and tall, had early settlements in the northwest of India, and Punjab was heavily settled. As they forced the Dravidians further south and conquered most of India, they laid the foundation for the classical Indian culture together with the earlier Dravidian inhabitants, who, before the Aryan invasion, had founded the famous Indus Valley civilization.

The Dravidians were described as short, dark and broad nosed (Ibid). Despite intermarriages, the Aryans treated the Dravidians as a subordinate race, and so the world saw the dawn of the Indian caste system. The word “colour” (Varna) is sometimes used instead of the word “caste” (Chapman. 1995, p, 14).

Hinduism still holds the social system of caste high (Baxter, et al (1998). The caste system consists of four main divisions, called varnas, which all form the basis for 3000 sub-castes.



The four varnas are: 1. The Brahmins, who are priests and custodians of sacred knowledge, 2. Kshatriyas who are warriors and rulers, 3. Vaishyas who are traders and farmers, 4. The Sudras who are people who perform manual labor.

If someone is born into a high caste it would generally mean that this person has a high status in society. Today there is a quota system that enables lower castes and the casteless the opportunity to get higher education as well as achieving position of power. However, it is very rarely that anyone has the possibility to change their status within society regardless of their achievements.

In rural India the castes live separately, the higher caste living in one part of the village while the untouchables live on the outskirts of the village.

The untouchables (Harijans/Dalit) are regarded as unclean because of their hereditary occupation. The top of the caste system is actually considered to be the purest and the grades of purity are considered to be lesser the further down the system one belongs.

Social status, economic power and occupational divisions are interconnected and the subordinate castes and the higher castes have all rights and obligations towards each other, religious sanctions can be made, and so the different castes are obliged to fulfill their own particular role in society. Baxter, et al (Ibid), states that one's caste often influences the social behavior of the citizens. Status, function and organization of sub-castes can vary considerably from area to area. For example, in the rural areas of the north higher castes are traditionally landowners, while in the south landowners are often non-Brahmins.

Traditional values, caste and the sacred being superior to the secular are persistent in Indian society. However, new values and symbols of status are becoming increasingly evident. A person's bank account seems now to have become indicative of a person's success rather than his background (although a high caste does often equal a heavy wallet). As in the colonial days of the British, education and the ability to write and speak the English language is a requirement to climb the social ladder. In fact, education, being able to write and speak English, political power, material wealth and higher social status are interdependent (Ibid). Also change seems to be evident regarding the subordinate lives of the backward classes and the untouchables in the village society. The fact that they now have the opportunity to get higher learning through the quota system, political opportunities that were not open to them before, and a new awareness of their potential political power (many political parties target

the lower castes and the casteless since they constitute several million potential votes), seems to create a milieu where the so-called subordinates challenge the upper castes, demanding the egalitarian status in society that the Mahatma Gandhi wanted for them.



Map 2.3: Punjab with districts

## 2.2 Punjab

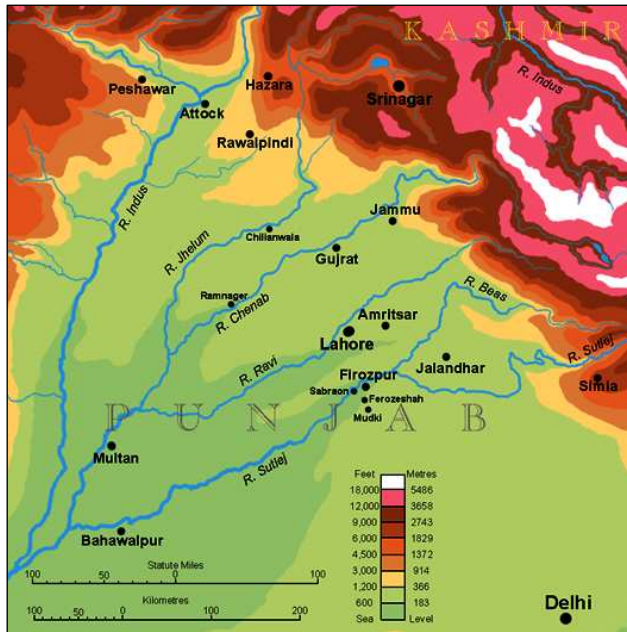
Punjab, experienced a transformation in both agriculture and economy when the Green Revolution made its appearance in the 1960s. Farmers gradually adopted the technology. The state of Punjab is quite small, only occupying 1.57% of India. Nonetheless, it contributes nearly 40% wheat and 60% rice to the central pool. 2.4% of the Indian population lives in Punjab. The sex ratio is lopsided with 876 females per thousand males, and increasing cases of female foeticide is reported. (Punjab state Environmental Report, 2007).

Punjab is situated as part of the Indi-Gangetic plains which is formed by alluvial deposits from rivers and tributaries. The two rivers, the Sutlej and Beas, traverse the state and Ravi and Ghaggar touch its northern and southern borders. The state has six major channels, these channels constitute a channel network of over 14 thousand kilometers with a complementary drainage network of 8 thousand kilometers (Ibid).

Beside surface water, groundwater is an important source for irrigation and domestic purpose. The quality of the surface water as well as the groundwater is deteriorating due to pollution from industry as well as agricultural runoff and erosion (Punjab state Environmental Report, 2007; Singh, 2000, 2001). 97% of the cultivated area is irrigated and about 85% of the state's water consumption is used in irrigation.

The climate is typically subtropical, with hot summer temperatures reaching up to 47 degrees Celsius and cold winters where temperatures can fall down to zero degrees Celsius at night in certain parts (Punjab state Environmental Report, 2007). The average annual rainfall ranges

from 58 cm in the plains to 96 cm in sub mountain regions and decreases from North to South.



Map 2.4: The five rivers of Punjab

Infrastructure and educational facilities are well-developed. The literacy rate is about 70%. Agriculture and other allied activities are the occupation for over 70% of the population. More than 83% of the state is under agriculture. However there seems to be a decline in agricultural land as many agricultural plots end up as industrial zones and housing areas (Ibid).

Governmental policies give the farmers incentives to choose to mono-crop wheat and the water-demanding paddy.

Subsidies on chemicals, free electricity to farmers, minimum support price and credit are among the tools used to help the farmers to choose their farming strategy. Cropping intensity has increased from 126% in the 1960s to 189% in 2005. The pressure on the land has naturally increased along with the increased ability to produce more, and results in depleted soil due to mono cropping, chemical fertilizers and depleted water resources due to the massive need for more irrigation (Punjab state Environmental Report, 2007; Singh, 2001).

Based on the cropping pattern and practices, the high cropping intensity means that the state needs 4.38 mham (million hectare meters), against the total availability of only 3.13 mham. This of course means that the over-exploitation of the groundwater is quite extensive. In fact, of the 137 blocks in the state only groundwater from 25 blocks are regarded by the Punjab state as being in the safe category. In Ludhiana, (the district we are here particularly interested in) 9 out of 10 blocks are regarded as over-exploited, the annual average water table depletion reaching 75 cm (Punjab state Environmental Report, 2007).

The nutrition content of the Punjabi soil is also a source of concern as it is low in nitrogen and phosphorus, and high in potassium. The intensity of the Green Revolution has made an impact

on the soil and the soil is losing its fertility, as a result the use of chemical fertilizers has increased by about 800% during the last few decades (Ibid).

Pesticide use has also made an impact, and dangerously high levels of chemicals found in humans and agricultural products have been recorded, and several insects and pests have developed resistance to the pesticides.

Despite the declining farm sizes in the state, mechanization is growing. Declining yield and income pushes marginal and smaller farmers into debt due to the need to buy more input. Low minimum support price and the many environmental factors are also reported to be incentives that put farmers into a spiral of debt. According to the Punjab Environmental report (Ibid) 65.4% of the Punjab farm households are reported to be in debt.

However, agricultural credit has contributed to the agricultural development and the farmers in the Punjab have met their capital needs with the help of formal credit institutions such as co-operative societies, co-operative banks, land mortgage banks, regional rural banks and commercial banks.

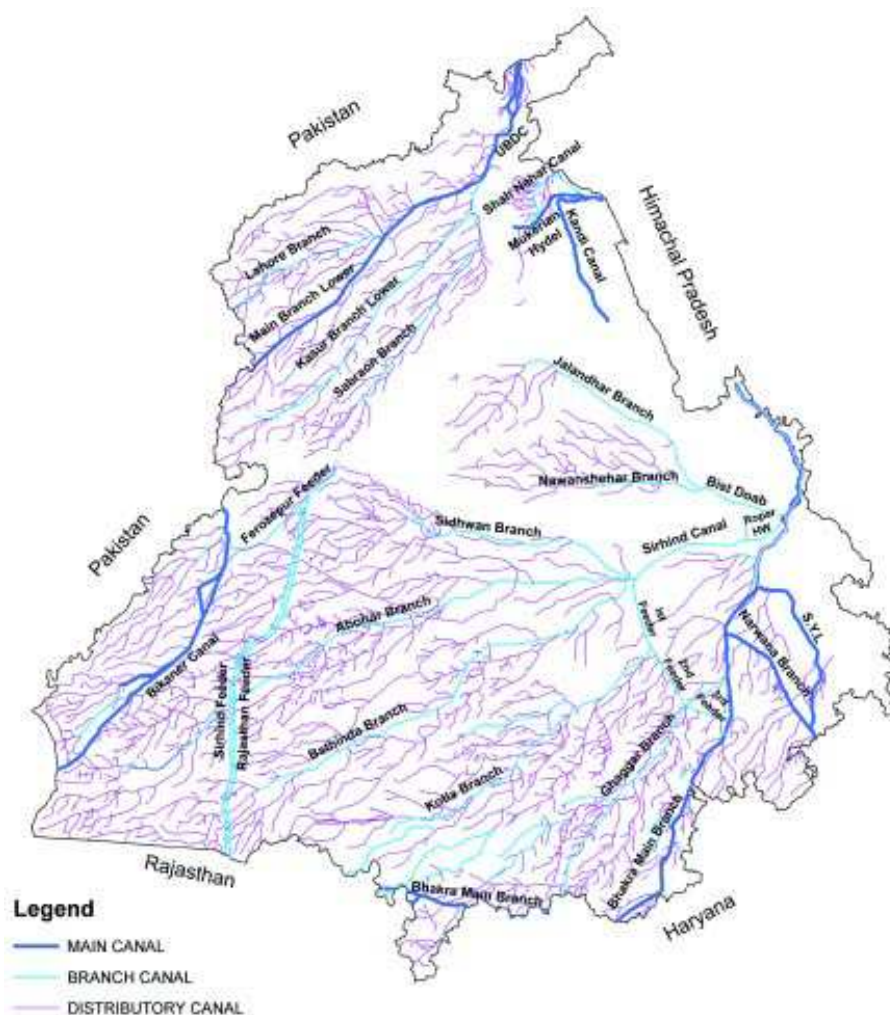
However, non-formal credit flows through commission agents, money lenders or *arhtias*, meet more than 50% of the credit needs of the farmers in Punjab. Interest rates are high, ranging from 24-36% as compared to financial institutions who charge a 9-12% interest rate. Electricity is a source of concern in the state. The demand is much higher than the supply, with weak monsoon rain increasing the problem. The state tries to ensure at least eight hours supply to the farm sector per day, worth noting here is that about 45 % of total demand in the agriculture sector is concentrated in paddy season. The state provides farmers with free electricity, thus benefiting them of Rs. 4320 million according to the Environmental report.

According to the census of 2001, Ludhiana district, which is situated in the heart of Punjab, had over 3 million inhabitants in the district. The area is described as occupied by Indigangnetic alluvium, the area is plain and major drainages are the Sutlej with its tributary and Budha nalha. Major soil types in the area are sandy, clayey loam and alkaline in nature (Central Ground Water Board (CGWB). 2007. p.4-5). The normal annual rainfall of the area is 680 mm and is distributed unevenly through the district in 34 days which is the normal amount of rain days. The monsoon, which reaches the district in the last week of June and retreats at the end of September, contributes with 78% of the annual rainfall, the months of

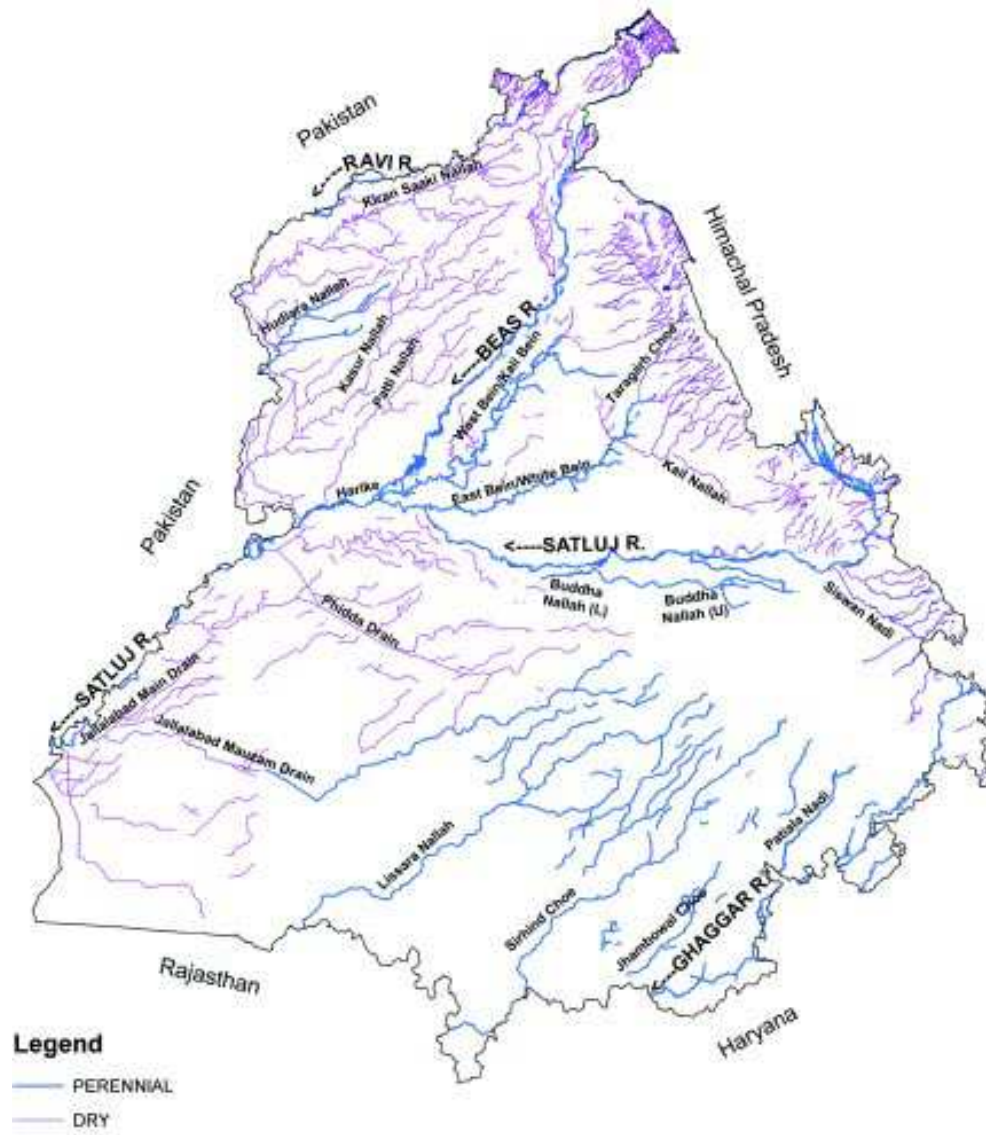
July and August being the wettest months. The rest of the rain is expected during the post-monsoon season (Ibid. p. 7).

By drilling data carried out down to 408 meters into the ground five levels of aquifers were revealed. The first was reached between 10 and 30 meters, the second between 50 and 120 meters, the third between 150 and 175 meters, the fourth between 200 and 250 meters and the fifth between 300 and 400 meters (Ibid. p. 9).

The water supply to the district is mainly based on ground water through tube wells. The canal irrigation covers an area of 90 sq. km out of 3060 sq. km area of total irrigated area. The remaining area is irrigated by ground water.



Map 2.5: The channel network of Punjab



Map 2.6: The drainage network of Punjab

## Chapter 3 Methodology

I came to Delhi on the 1st of February 2010. I had a basic idea about the research at hand, and wanted to perform a *case study*, map farmers' *farming systems*, and gather data about farmers' *flexibility* at village level. I needed to be flexible and adapt as I went along. I intended to get contacts through the *snowball method* in order to be accepted in a village that would serve as my field of study.

I felt that over two months in India would give me enough time to get the data I needed. However, time was soon to be of an essence, and together with the lack of people who spoke English, this became a major source of concern. It should be taken into account that such issues necessarily caused some limitations and consequences to my fieldwork.

I must emphasize the friendliness of the people I met along the way, and the fact that the people mentioned in my thesis did all they could to help. I must express my deepest respect and gratitude towards all the involved parties. However, the long and winding road towards making this thesis needs to be accounted for, and the readers' right to be enlightened about certain aspects that might have affected the data collecting must be ensured, and my hope is that I am able to make the research transparent.

The people, places and institutions involved have been given anonymity to the best of my ability.

I will start with elaborating about the importance of being aware of *statuses* and *role expectations*, before giving the details of how I got access to the rural areas, and how the statuses of my helpers and I affected my surroundings and the fieldwork.

I have tried to be aware of the importance of showing *Critical reflexivity* (Dowling (2005) throughout. I will end this chapter by scrutinizing the *methods* used for collecting data, and the *ethics* involved when conducting the research.

### 3.1 Status and role expectation

Aase and Fossåskaret (2007) underline the importance of being aware of one's *status* and *role* when conducting *fieldwork*. The *status* which is given or is earned, will to a large extent decide the framework of rules, restrictions, rights and expectations of conduct from the surroundings. This is called *role-expectation* and functions as a framework for a person's

*status* to act freely within its boundaries, making it possible for a person within a certain *status* to create his or her own *role* within that particular *status*' framework.

However, the freedom to act within one's respective *status* framework, and the *role expectations* which follow this, is *culturally* defined and can therefore often become a source of conflict. For instance, when I needed to come home later than usual, I mixed my understanding of my freedom of movement with my *status* framework. It was quite clear that my *status* as a girl/woman/daughter within the Punjabi rural expectations, with the rules and restrictions that followed this *status*, was not compatible with the Norwegian expectation to the *status*. Whereas in the rural Punjabi understanding of this *status*, I should come home well before dark, the Norwegian *role expectation* of the term was completely different.

Worth mentioning in terms of this particular situation (and many more) was the fact that I was juggling different *statuses*: the *status* as a daughter, which would mean a close relationship with the family and a mutual responsibility to each other's honor and safety, and my status as a researcher, which would entail a somewhat more distant relationship to the family, being very aware of my responsibility to my university to conduct my thesis, and to do so in the correct manner ( for instance by being respectful to one's informants and hosts).

Having problems with finding a "way of conduct" that would be acceptable within these frameworks, and struggling to find a harmony between several *role-expectations*, *role dilemmas* were frequent. It was not easy to find a suitable status that would make it possible to incorporate the work of a researcher. *Role dilemmas* and expectations to one's *status* were not only inflicted upon me, but also on my translators and my surroundings, and I will come back to this later.

Aase and Fossåskaret (Ibid)) states that if one is not satisfied with the *status* one is given, one should act contrary to what is expected of that *status*. This strategy will allow the researcher to get out of an unwanted status and thus be able to move forward with the *fieldwork*. This strategy was attempted time and again, but always in a way that would avoid causing offence.

### **3.1.1 Getting to a Punjabi village**

After two weeks of waiting in Delhi, my initial hopes of help from my network began to dim. Eventually, however, I was finally on my way to the Ludhiana district, in Punjab. A contact at a university there had been arranged. "Ajeet" and two students were offered to be at my



assistance. The intention was that they would come with me to a village and act as translators and guides. However, I was soon placed in what seemed to be a never-ending spiral of new office doors as new people were repeatedly appointed as “my guardians”. My status as a girl, a foreigner and a student was evidently a major concern since the issue of how one could help a female, foreign student with the research and also ensure her safety was a source of constant debate.

Attempting to change my status, as suggested by Aase and Fossåskaret (2007) proved in this case to be difficult. In the end I tried to change my unwanted *status* as the subordinate by making a unsuccessful attempt to have my status as a researcher accepted, since this would provide me with the freedom of space and the very necessary egalitarian interaction with my superior helpers.

Realizing that I was not getting further in my attempt to reach a Punjabi village, and that nobody had the opportunity to act as my translator and guide, I was uncertain about how to deal with the situation. In India you are regarded to be a bad host if you deny a guest’s wishes, and I did not want to offend my hosts and risk them losing face by showing my discontent with the situation. However, whenever I brought up the question of getting out of the enclosed campus area and leaving for a village, I was repeatedly encouraged to contact the farmers who came to the campus instead.

*“It is dangerous in the villages, you have everything you need here Miss, you don't need to go out of the campus area, you can talk to the farmers here”.*

This was a statement I was to get quite used to. But how was I supposed to talk with farmers when there was no one who had the time to translate? Being a novice researcher I knew nothing about Punjabi villages or Punjabi farming. So how would I be able to ask the right questions? Besides, I was certain that staying at campus would never give me the insight I required as to how farming in the villages actually worked.

I could quite easily have been forced to conduct my research at campus had it not been for the fact that I eventually became quite frustrated, not because I did not get any help, but because I did not get the help I needed and asked for. I eventually shed my fear of offending anyone, and shared my frustration with “Ajeet”. Now, my contact in Delhi had trusted “Ajeet” to help me and otherwise ensure my safety. “Ajeet” had therefore been given the status as my host by

a superior and this trust had to be respected. So before I knew it, a contact in a nearby village had been arranged.

So after over a month in India my status as a guest finally paid dividends and I found myself on my way to a village which we can call “Pind”.

### **3.1.2 Female translator**

My contact in the village presented me to his female teenage cousin who belonged to the Jaat caste and had been sent to the Punjab from Canada in order to learn about her Punjabi roots. “Britt” was willing to help me in my research. However, the fact that she had several restrictions because of her status as a female Jaat, meant that we were dependant on someone who would have the time to act as chaperons. This caused new problems to getting the work done for my research.

The fact that “Britt” was a female and therefore not allowed to walk around in the village or talk with males other than her close family, was obviously a problem, especially since the farmers were all men. She was also an inexperienced translator and would answer questions herself and sometimes not translate at all. Nonetheless, to find someone who could speak English and who also had the time to help me was a tremendous relief. The difficulty caused by “Britt's” restrictions and our attempts to work within their boundaries instead of against them, may be illustrated by two episodes:

Debating my question if “Britt” could come with me into the village streets, the whole family agreed that we were allowed to stroll through some parts of the village as long as her grandmother and aunt accompanied us. This provided me with a very simple overall view of the village and the households and I got some interesting information about females’ overall view about chemicals and pesticides and which strategies they had in order to provide their families with food that they felt was good for them. However, the data collecting quickly came to an end when the two elderly ladies who chaperoned us suddenly decided that they had had enough. Later that day I found the aunt lying exhausted on the sofa. The day had clearly been too much for the two elderly ladies, and so our day out proved to be the first and also the last. Some days later “Britt” and I tried to do some work, this time chaperoned by a male relative. Talking with a female relative, conversation proved to be quite difficult since our chaperone insisted on answering my questions himself in spite of my instructions to let

her answer, and completely ignored the lady of the house. I asked him why he did not follow my instructions, and he replied;

*”But I am a good farmer and can answer these questions”.*

This reply reflects the perceived expectations in the village regarding gender. It did not matter if the woman I was asking lived on the farm in question, and was also a great asset to the management of the farm and of the household; she was simply not regarded as a farmer. “Britt’s” gender seemed to make the family show extra precaution towards her, not least because of her Canadian upbringing and her status as a Canadian citizen. However, when asked, a village girl agreed to act as a translator, but also confirmed that the restrictions inflicted upon Britt were largely also inflicted upon herself. Although there might have been some extra safety-measures that went beyond what the village girls normally had, quite simply because Indian immigrants and the foreign researcher might become a source of envy and the target of unwanted attention from the opposite sex, but also from those who hoped for sponsorship that might lead to a better life in another country. As “Britt” stated before our one day out in the village:

*”There are many people who are envious because I live in Canada, and so they poison the tea so that we get very sick. I will tell you if you can drink what we are offered”.*

All the restrictions on a female's freedom of interaction in society and space in general, often proved to be quite difficult to combine with my fieldwork. Although I was given the one time opportunity to interact with the ladies of the village, and at times some close relatives of both sexes, the space and scope of the interaction was quite limited and framed within the home environment. This again meant that there was no room for a sound overview of the work out on the fields, and in the village in general. This was obviously no basis for further developments in my project, among other things, because there were not enough people in this limited environment to interview or to conduct any kind of acceptable survey sample.

So what would happen if I could find a male translator instead of a female?

### **3.1.3 Male translator**

I

met “Balbir”, a young Jaat man who was educated in the USA and was now working in a non-farming business, as I walked in the village streets searching for a translator and simply asking everyone I met if they spoke English or knew someone who did.

As with “Britt”, “Balbir” was inexperienced, and would also answer questions and sometimes put on a dejected demeanor at many of the questions I asked, and I had to put pressure on him in order to get him to translate. I hoped that things would get better, and thankfully, they did. However, it quickly became apparent that, despite the fact that “Balbir” had status as an educated Jaat man and an insider in the village, there were complications due to my new translator’s limited freedom of interaction in the village society.

*Firstly*, he could not visit or talk with females or other castes. This would of course mean that I would not be able to communicate with other castes, and although the farmers in Pind are all claimed to be of the Jaat caste, I felt that this closed the door regarding some potentially interesting data. The fact that I would also not be able to talk with random females was also discouraging. However, I put my faith in the fact that I would now, as with “Britt”, at least have an opportunity to talk with “Balbir`s” close family.

*Secondly*, he was not willing to knock on strangers' doors or talk to people who he did not know. This meant that there would be no strolling around in the village talking to whoever I met, or engage in spontaneous informal field conversations and arrange interviews with whoever I wanted to. Communication would therefore be restricted to farmers “Balbir” already knew and who had the time to meet me. The household survey would be quite time-consuming, and in fact quite impossible if he did not personally know enough farmers to get a sufficient sample of data. I had great difficulty in understanding why talking to strangers in the village should be such a problem, and my questions about this issue remained unanswered despite my many efforts to unveil this mystery. However, one possible explanation, or at least a partial explanation, might be the fact that “Balbir” was a victim of some petty jealousy because he had been in the USA and had an education. According to him, this was a source of conflict with some people.

*Thirdly*, being an active member of the SAD political party, he could not talk to people who were members of other parties. This problem became apparent when “Balbir” eagerly informed me that he had tried to arrange a meeting for me with a Congress party member who was quite high up in the system. However, when the local SAD party heard about this they stated that this meeting could not occur because a SAD member could not interact with a member of another political party. This would of course mean that if there was anyone in the village who strongly believed in the agricultural political incentives of other parties than SAD, I would not be able to talk with them. However, I strongly believe that the farmers

answered their questions from a strictly individual farmer's perspective. Nonetheless, I found it wise to ask every farmer I interviewed if they were active in politics in order to be able to consider how this might affect the answers they gave me.

*Fourthly*, “Balbir” did not get home from work before late in the afternoon. This was to become a major problem, since this would only leave about one and a half hours to do interviews and to try to collect answers for the household survey before the farmers went to bed. This limited amount of time was also of course dependant on both ”Balbir” and the farmers' availability to meet me.

However, I had to make the most of the situation as it was, and “Balbir”, being a male Jaat, could make it possible for me to get an insight into the farmers' world.

#### **3.1.4 The university assistants**

I made many unsuccessful attempts to get the two assistants from the university to come to the village to help me. For every request, the reply would always be that there would be no problem and that they would meet me the following day ready to be at my assistance. But they never came.

I had earlier suggested that I could pay for their time and efforts, thinking that this could perhaps be the reason for the apparent unwillingness to travel into the rural areas. However, my suggestion was not well received and they were quite offended by my proposal because I was a guest and should therefore receive their help as a matter of course. In fact, this view was a standard answer in the Punjab. When suggesting the same to “Britt”, “Balbir” and others, no-one wanted any payment for their time, stating that as hosts they were obliged to help. This of course hindered any employer/employee relationship, were this status would entail role expectations such as actually turning up for work. As mentioned, in India a good host cannot deny a guest's wishes without staining his own and his family's honor. Because of this I could understand that my two assistants were not being difficult or unkind when not meeting me as we had agreed. Nonetheless, my patience was being tested to the limit. Had they not been asked to help me? Had they not agreed to help me, and more importantly, repeatedly assured me that I was their guest and that they would be more than happy to help me? The fact that I had stayed in the Punjab for about four weeks and had still not succeeded in even getting them to the village, was therefore very frustrating. By doing this, had they not

crossed the line between the obligations of being polite and good hosts and being bad hosts, despite their politeness?

When expressing my feelings to my two assistants, I finally got a look behind the facade. They stated that as the university was responsible for the students' safety, it was not accepted that students travelled alone into the rural areas since this was considered to be dangerous. It was clear that my two assistants had been battling their own role dilemmas' as they tried to grasp their own freedom of space in order to act within their status as a good student whilst at the same time trying to be good hosts towards me. But I was now promised a solution, and it was quickly arranged that two young male extension workers would help me.

Why was there suddenly positive response to my concerns? It might be safe to assume that some significance can be placed on me, once again, shedding my concern for offending others and making a firm statement about my troubles. It might seem that if one actually demanded attention and the fulfillment of promises made, then the fear of being considered as bad hosts and thus losing face, would give results. It now seemed that I might actually get help to do what I came for. I knew that the power my status as a guest had provided me with had to be managed in a respectful way, but this new insight was confirmed and re-confirmed several times and proved to be a door-opener in my fieldwork.

Many people in the urban areas had expressed concern because they regarded the rural areas to be dangerous. Despite this, my new friends came to the village, something that led me to believe that they were not afraid. However, noticing the baseball bat placed on the floor by the seat next to the driver, brought some questions to the surface, and I was given a short reassurance that it was only there for safety reasons and that it was not unusual in the Punjab to have this item in the car.

I could not help but to think about a first-hand description I had been given some days earlier by some young Jaat men who had been out in the evening armed with baseball bats. They had been searching for people they referred to as "enemies". It was only clear that my new friends considered their status as outsiders in the rural area to make them vulnerable. This made them want to conduct the work quickly so they could get back to the city. I could only conclude that there seemed to be a great deal of tension between certain groups in society. This aspect of the research will be dealt with later on in chapter 5.

However, my new assistants had finally come to my rescue and we now had no time to lose. But some issues in our collaboration immediately came to the surface. For some reason, and somehow, instead of contacting me on their arrival, my assistants contacted “Balbir”. He gave them instructions regarding my household survey, despite the fact that I had especially stated that I needed to be in full control of my research. Now my plans were set aside and the two assistants and I hastily set off to do some work. It was quite clear that they were in reality “Balbir`s” assistants, and that they, with their own experience from the extension office, would act according to his orders and advice. This might have something to do with “Balbir” being a male, an insider in the village, and also superior to me on the educational ladder.

### **3.1.5 Living in a Punjabi household**

At first I was obliged to travel from Ludhiana city to the village every day with an arranged driver. This was of course costly, and I also felt that I was missing out on some aspects of village life. However, after some time, I was invited to come and stay with “Britt's” family in Pind. I was reluctant to accept this kind of invitation because of the many restrictions on females in the village that would be incompatible with me being able to conduct my research in any other way than from a purely female, household perspective. The family, however, assured me that no restrictions would be forced on me and that I would be free to come and go as I pleased since I had work to do. And so I became part of the household and was quickly given the honorable status as sister and daughter, a status which proved to be difficult to combine with my work, as we shall see later.

At my new home I had the opportunity to experience the way of the household in depth, and things that had been closed to me earlier when living in the city. I wanted to contribute in some way and so provided myself with the job of dog-walker. In this way I could contribute something while at the same time be able to walk on excursions in the fields and the village without anyone being too worried, as I was walking a big dog.

However, although being positive and helping me to the best of their ability, it soon became apparent that using “Britt” as a translator would more often than not be pointless since the restrictions inflicted upon her because of her gender and the many safety issues involved, would not provide me with a passage into the world of farming.

The family also seemed reticent about discussing farming. So I went out in the village and provided myself with a translator, and became even busier with my work. I was very often out

of the house, with or without my new-found translator, as I tried to provide information for my thesis. To my surprise “Britt's” family seemed to be unhappy about this, and “Britt” also informed me that the small gifts I would give the family as a sign of respect and as a contribution to the household were taken in a bad way.

*”Now she no longer needs us and we are being fobbed off with biscuits”.*

The fact that “Britt's” family had denied that there was anyone in the village who could speak English, when they quite clearly knew “Balbir”, was also surprising, although the intention might simply have been to keep me safe.

Trying to find a way to keep everyone happy and at the same time conducting my work, was not easy. At the same time I was trying to overcome even more obstacles in my path, such as trying to combine the few hours that the translators were available and at my disposal with the limited amount of time that the farmers themselves were available to talk with me. And of course, the very limited amount of time I now had left in India.

The incompatibility of the family's rules and my attempts to conduct fieldwork became even more evident when I one day stumbled into what was regarded as an unacceptable situation. I had told “Britt” that I would come home late one day because “Balbir” had persuaded a farmer and his family to stay up late for a meeting with me and a possible interview, because he did not have the time to act as a translator until then. This time of day was very late for the family, who would get ready for bed at about seven o'clock in the evening. The sudden discovery of restrictions came as a surprise because no one had told me about such a restriction. Nonetheless, I was totally dependent on the time the translator could offer me of help, especially since my time in India was running out fast. So it became obvious that the living arrangements with the family were not satisfactory for either of us. So what to do?

Recognizing our problems, the family came to my rescue. As good hosts, they needed to help to find a solution that would work out for all of us, without any of us losing face. The explanation for me leaving the family was therefore agreed to be, that for the sake of being functional in relation to the limited time I had left to do my work, the family, being good hosts who wanted to help me in every way possible, recognized this problem and suggested that I would save myself some time and stress if I moved in with the translator's family.



But would I escape what seemed to be a never-ending cultural confusion at my new living arrangement? Unfortunately the answer was no.

Instead I now got to experience some new aspects of household life. It was stated that I could come and go as I needed to and I was again not presented with a set of rules when I moved in. Without these I had to try to work out the “correct” way to conduct myself, and there were some occasions when I would clumsily cause a cultural clash. For instance, it became apparent when I tried to talk to “Balbir” about the project, that this could not be done at home without a chaperon. This was a bit of a problem because “Balbir” was very busy and would more often than not come home after his farming family had already gone to bed.

An episode that is worth mentioning is when the lady of the house told me that a visiting guest at a neighbor’s house had asked her if “the white girl” (me) had come to visit “Balbir”. Naively I suggested that the woman had only tried to make conversation. On the contrary, she stated, the woman had been rude, and she had cried when she got home because of this woman's remarks. From my cultural standpoint there seemed nothing bad about the woman's question, but only normal curiosity. But for “Balbir`s” mother the remark was so much more than that, and was considered to be a reflection of the public’s general view of her family. “Balbir`s” mother felt that the correct interpretation of the lady's remark was that she had insinuated that her son had a special unarranged relationship with a girl. What was even worse was the fact that there had been insinuations about a white girl - a casteless. Her fear was that her family's honor was at stake (chapter 5 will reveal more about the importance of honour).

However, she was a good host and a proud woman and had boldly stated that I was a guest at their house, and a student who they were helping. Now, this really made it quite clear that my status had gone from “daughter” in the other family, to “guest” and “student” in my new family. Although this status might have offered the family some stress as in the case with the woman who wondered who I was, since the daughter-status would have taken the edge off the comments mentioned above. However, the student and guest status now enabled me to act more freely in society while at the same time making it somewhat easier for the family since they did not have to act according to the expectations of certain restrictions which a daughter-status would entail in order to sustain the family's honor. I was now a guest, a student and eventually a friend, and as we finally said our good-byes, I was again provided with the honor of being given the status as daughter.

### 3.1.6 Being part of society

Many people had not known how to act around me or what to expect of my behavior because the statuses I had been given did not provide me with a sufficient tool to incorporate my researcher status. In my attempts to create a new understanding of the girl status, I would bicycle around in the village, walk the dog and attempt to communicate with people I met, whilst all the time being very conscious of not losing face or doing anything that would cause others to do so. I did stand out quite a bit in society not only because of this, but also because people were not used to seeing a white person. This often caused a great deal of attention and fuss, and presumably some sort of “fame” as villagers, both strangers and friends, would storm out into the street as I walked by their houses, taking pictures, offering me chai, dinner, hand-shakes and calling me by my nick name.

I did stick out in society quite a bit with my fair hair and pale skin, but it was quite clear that villagers did actually see me as the village’s guest, and that they had heard why I was there through the grapevine and this provided me with access to other households. However, not being able to communicate proved to be a tremendous barrier although I was able to observe and presumably eventually get some understanding of what was going on.

My status as researcher or student initially meant that I was placed on a higher level than their own. However, this was short-lived as the farmers’ expectation to this status was eventually set aside when I stated that I actually needed to learn from them, something that became quite obvious as my many ignorant questions often did not unduly impress the farmers. Eventually, I was given the honor of being provided with the status of not only guest, but also as a friend who was on a mission. I was not only what one perhaps would regard as an “eccentric” student, researcher, female foreigner and guest. It might be safe to say that a new status had been developed, a status which both I and my small network of friends in the village had negotiated through much trial and error, as Aase and Fossåskaret (2007) points to.

This status made it possible for me to roam as freely in society as possible despite the language barrier, cultural differences, my general ignorance of the correct conduct and the very limited amount of active time I had left in the field. All this might be illustrated by the fact that I was eventually invited out in the fields by my new friends in spite of my gender.

Although it might seem that the villagers also wanted to be part of the negotiation, the status seemed to be accepted by them, and they seemed more than happy to help and keep me safe, something that might be illustrated by all the times I went out on excursions by myself, soon to be followed by an entourage of villagers making sure that I would return safely from my trip.

However, the snowball method should also be mentioned as a door opener into the field. Through my search for an understanding of the village I had establish friendships with a few young English speaking members of farming families, and when my status had been established, I was eventually invited to arenas which had previously been closed off for my attendance, I was invited to the Gurdwara and eventually invited out to the fields by the farmers.

I will now elaborate about the chosen methods for data collecting in field.

### **3.2 Qualitative and quantitative methods**

Winchester (2005), states that *qualitative* and *quantitative methods* are often seen as being in opposition to each other. *Quantitative methods* have been regarded as being value-free and objective, carrying the torch of true knowledge with its mathematical approaches and its basis in scientific laws. This “hard” science has been, and still is, largely regarded to be superior to *qualitative methodology*, which has often been viewed as a subjective supplement likely to bring biased research into the scientific debates.

This might be illustrated by the recent work of Fotheringham (2006), who states in his work about *positivism* in relation to *quantitative methodology*, that some *quantitative* researchers claim that *qualitative* research is incapable of capturing hard evidence that will stand up to a cross-examination because it has no logical framework to allow the reader to distinguish good research from bad.

Fotheringham further expresses discontent with qualitative research as he knits together *qualitative methodology's* rising popularity with society's growing belief in aliens and angels. However, as Winchester (2005) points out, it has become evident through feminist geography that the much viewed objectivity of *quantitative methodology* is at fault. Thus, it seems apparent that all methods are value-laden and open to subjective usage, thereby bridging the gap between the two forms of *methodology*.

The presumed subjectivity of *qualitative* research is in fact duly noted by the good *qualitative* researcher, as she strives to make her research transparent by being open about any issues or circumstances that might affect her writing or view on the research area and implementing it into the research at hand. The good qualitative researcher will always seek a high degree of rigor and validity. As Mansvelt and Berg (2005, p.263) states:

”Communicating qualitative research is as much about how we know, as it is about what we know”.

The discontent with *qualitative* research is not shared by all *quantitative* researchers. Many, as for instance, Lobell et al. (2008), see the need for implementing *qualitative* research into quantitative research. This is for example relevant in climate change research, which has been dominated by large scale quantitative and spatial research, but lacks the ability of accurate knowledge on a local scale, which again makes it difficult to advise on measures of adaptability as stated by Aase et al. (2009).

This might perhaps make it obvious to planners and governments who have taken *quantitative* research to heart because of its simplification of the world, that more focus on *qualitative methodology* is essential to laying solid grounds for a good adaptability plan within climate research.

This thesis can be regarded as a *triangulation*, although highly *qualitative*, contribution to the climate adaptability research, admittedly seeing *qualitative* and *quantitative methodologies* as contributors where each respective approach provides its unique share to the debate. This makes it possible, according to Winchester (2005), to see the range, scope and generality while at the same time being able to dig deeper into the layers in question while trying to understand the world of the individual.

### **3.2.1 Observation**

As I was mainly left on my own with no means to communicate with anyone, *Observation* proved to be an asset which I found to be very useful. Observation became a tool that enabled me to create further questions. Because of my somewhat restricted access to certain arenas, inadequate time, and communication problems, I became very dependent on simple observation. Being able to grasp the reality of my observations and confirm that my understanding of a situation was correct ( Aase and Fossåskaret, 2007), was not always easy,

and some had to be explained by informants later in informal conversation, interviews or through the scrutinizing of the survey, and some had to be explained through secondary sources.

Observation is stated by Kearns (2005), to move beyond the interview, which is a more formal and somewhat artificial way of interacting. A participant observation, on the other hand, will provide a deeper understanding of society through its direct experience of everyday life. The hope is that one will be successful in getting access to those deeper layers of society that are not brought to the surface because of, for example, informants' unwillingness to let strangers get a negative view of their local environment, or informants eager to please the researcher by providing the answers they think the researcher wants to get.

For example, when asking a farmer about his and the farmers' pesticide usage and safety precautions that were taken when spraying the fields, it was claimed that all farmers made sure that they followed the safety measures prescribed. The question had come to the surface after many confirmed early deaths from sickness among the male farmers in several households. It is not easy to establish what had caused this, but when I observed a farmer who sprayed his field with pesticide without taking any safety precautions many questions arose. Aase and Fossåskaret (2007, p.61) state that a successful participant observation is dependent on the researcher's ability to establish relations with the informants, and being able to reflect on which status she has been given and her interpretation of this status. I might claim that I, in the time at my disposal, eventually managed to get as deep as I could get into the various aspects of the farming system and the farmers' working conditions.

My many statuses provided me with access into different households, formed many friendships, and gave me contacts and observations, but never gave me access to the fields where I needed to be. But as the end of my fieldwork approached, a turning point came when I was formally invited out in the fields, (where the male farmers were working). Although we lacked the ability to communicate with each other most of the time, a kind of mutual understanding developed and my accepted status allowed me to be invited to participate and observe, and thus gave me access to this important part of my research. Getting access to the fields at the very end of my fieldwork proved that I had reached a status which moved beyond that of the traditional gender expectation, and, as Aase and Fossåskaret (2007) points out, reached a common ground where the participants and the researcher understood each other and allowed me to get access to issues, places etc. that were relevant for the research at hand.

All in all, my role within the household, fields and the environment in general, was very much as participant-as-observer, being involved but also detached (Gold, 1958), and the researched being aware of the researcher's intentions. However, as Kearns (2005) points out, in view of the researcher affecting the arenas that are the subject of study, this was often the case, as I was having some difficulty in blending in. This can be illustrated by picture 3.1.

Lastly it is important to state that, being a stranger and unknown to the ways of farming, it is quite possible that some important situations and observations escaped scrutiny.

### 3.2.2 Survey

This borderline quantitative research method was conducted among 50 farmers in the village. The questions were a mix of open and closed questions, as stated by McGuirk and O'Neill (2005), were the closed questions sought to gather quantitative information. The closed categories established, do however give room for errors. This issue has been attempted solved by the implementation of qualitative questions that seek to reveal a deeper understanding of the issue.

I have further provided the farmers with answer options that allowed them to give further information such as the quite open categories, Other? Or please specify?



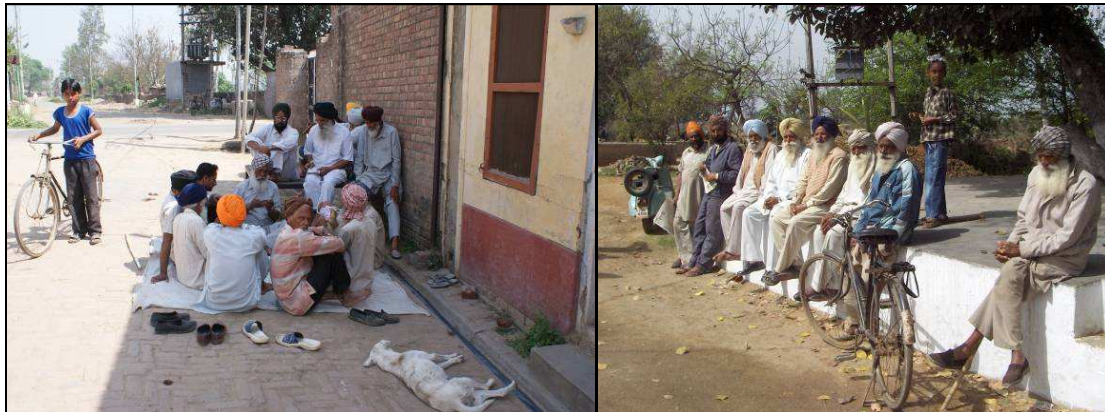
*Picture 3.1 When the researcher affects the research area.*

The survey attempts to collect data about the farming system, farmers' strategy to handle water shortage and the farmers' vulnerability. The survey method was originally meant to be a household survey.

Unfortunately this proved to be hard to execute because of the difficulties in getting assistants who could conduct a suitable sample size and because the

farmers were rarely at home - when the farmers were not working, most would gather at meeting places where they would socialize with the other farmers (as illustrated in picture 3.2 and 3.3), thus making it difficult to conduct a survey in which the interviewee could be able to answer the questions without other farmers making remarks.

There was also a problem relating to the fact that my assistants insisted on asking for each individual farmers name, and to write it down on the survey.



Picture 3.2 and 3.3. Conducting a survey in social arenas.

This failure to allow anonymity and create an environment in which the informant would feel no pressure with regard to what he ought to answer may have had an effect on the survey. It might for example have been difficult for a farmer to reply to questions regarding how much he earned and how many *killas* of land (one *killa* equals one acre) he owned, when other farmers were listening, since such information related to the codex of farmers' pride and *izzat*; a farmers social merit. A man's *izzat* is measured in terms of how many *killas* he owns, and the more *killas*, the more *izzat*. *Izzat* is however not reflected in whether the *killas* are cultivated or not. The Jaats regard themselves to be good farmers and take pride in their ability to utilize their land in the proper manner. This will of course be reflected on the farmer's earnings as he balances costs and profits. For a farmer to admit to low earnings while other farmers are listening is therefore out of the question.

Another issue regarding the survey is the fact that my assistants were in quite a hurry to get the work done, thus not making much room for any of us, including the farmers themselves, to go much in depth, while also making mistakes that led to situations where some questions lacked answers.

Despite efforts to make sure that the correct used measurements got implemented into the survey questions, as suggested by McGuirk and O'Neill (2005), by testing the survey on locals before going through with the sampling, some questions have created confusion with regard to measurement. For example when asked how many kg fertilizer per *killa* were used on the field, many gave their answer in *tractors*, not only making it difficult to comprehend how

many kg this actually is per killa, but also making it difficult to compare the data with those who provided an answer in kg.

However, the survey's standardized, formally structured questions, proved to be helpful since this brought forward a foundation of awareness regarding issues that would require in-depth interest when conversing or conducting interviews. The survey also proved to be quite an asset that enabled me to indicate the diversity, but also the homogeneity in the management of the farms.

### **3.2.3 Personal interviews and other methods**

The interviews were conducted with seven males from the Jaat cast, ages ranging from 26 to 63. All informants define themselves as farmers, although two of them do not own land per se, but will inherit their fathers and have been working on their farms for many years. Three of the farmers also work within education and one as the leader of the local Co-operative society. One of the informants has earlier worked in the private sector, selling fertilizer and pesticides. Another informant is the leader of the local SAD party. Some of the interviews were conducted at the farmers' homes, surrounded by family, while others were conducted at the home of my host.

A few of the interviews were arranged and conducted without the help of a translator due to the informant's adequate English skills. In regards to challenges when using an interpreter, I was not only faced with the difficulty regarding concepts, metaphors, expressions, etc. that got lost in translation. I can mention one particular interview as an example as it expresses the somewhat sudden challenges a researcher is faced with. When conducting an interview with one of the informants, the translator suddenly had to leave, and so this interview was completed by the use of my bad Punjabi language skills and the farmer's skills in English after two months attendance at a English course. Needless to say, some of the answers are questionable and are therefore overlooked.

All the informants gave their consent to be interviewed and were given the assurance that I would give them anonymity, although it was stated, and duly accepted by the local SAD leader and the local Co-operative society leader, that this would be difficult, and somewhat unwanted, in their cases due to their position in society. Due to practicality, because of the differences between the farmers and the translators' life styles, some of the interviews had to



be split up in sections, taking two or three days to complete. This made it difficult when new information came to the surface that called for follow-up questions.

The interviews were semi-structured. This was done because I wanted the interview to float as much as possible in a natural way, providing me and the informant with the freedom to be flexible in exploring interesting issues that were not part of the interview guide, or were part of the guide but needed additional questioning. Semi-structured interviewing also allowed the interviewer to direct the conversation back to the topic of interest should the conversation travel into topics that clearly had nothing to do with the research issue, (Dunn. 2005). Perhaps worth mentioning here is that one informant, a highly respected man well-known for his wisdom, suddenly ended the interview after I had for thirty minutes politely attempted to direct the interview back to relevant issues. After this he was very busy and made himself unavailable.

Before starting the interview it is stated by Dunn (Ibid) important to establish contact with the informant. I would therefore begin an interview by presenting myself and the research, well aware that some inhabitants in the village had expressed high hopes of my presence, claiming that I had come to their rescue, and that light would now finally be shed on problems such as corruption in the area. One farmer stated that he was relieved that I had come, and believed that this would help to give hope and prosperity. I did not want to give the villagers' false hope, knowing that my thesis would not affect their lives in any way. I therefore tried to clarify this and reduce their expectations by stating that I was merely a student conducting my master thesis and that I had come to the village in the hope of learning from the farmers themselves.

During the interview, or field conversation for that matter, I would look for facial expressions and body language to see if it matched the answers given, something that would indicate a deeper meaning to the expressed answer, whereby I could ask further if I had understood the answer correctly, or test it if I thought something had gone missing in the translation.

Dunn (Ibid) refer to Tremblay (1982) when stating that one can make changes to the initial interview guide as one goes along. This often seemed necessary as there was much new information that came up during interviews and in general during the day when I was observing, conducting some surveys, or having an informal field conversation. Some new information would lead to questions being dropped altogether, because they were then proven

to be irrelevant. Instead, other questions needed to be implemented to the interviews because new information demanded a deeper insight and understanding.

Informal field conversations were very limited, but did however prove to be most helpful in the general data collecting and when laying the foundation for the knowledge base.

Another method for data collecting was photo-eliciting, where I would take pictures and later show them in order to get an explanation about what I was looking at. I would also draw from the use of map-making and drawings in general, where I would attempt to express my understanding of the village, and whereby the locals would correct my errors and create their understanding of the village. The usage of a field-diary also came in handy.

### **3.3 Ethical research**

Throughout this chapter I have tried to touch upon the many ethical dilemmas experienced while in the field. Being a newcomer to both the world of research and the do's and don'ts in fieldwork, I find it wise to give a short reflection on ethical issues when collecting data.

Dowling (2005) points out the importance of being aware and concerned with one's responsibilities to those who are being willing participants to the research, and to those who become involved in the research unwittingly because of an informal field conversation or an observed action.

When applying the qualitative approach one finds oneself quite close to the informants and may be welcomed into their homes and asking them questions that are personal. It is therefore important that the researcher is aware of any implications that the final product might entail for those who have been involved.

As noted earlier, anonymity has been sought after, and the use of pseudonyms and occupation has replaced the informants' actual persona. Being very open about why I had come to the village, and the explanation of why I wanted to meet farmers and villagers in general, and what I wanted to talk to them about, brought about openness. However, to what degree the people involved understood the somewhat uncontrollable nature of a written text should not be taken for granted.

Fieldwork entails the need for the researcher to be constantly aware that her behavior and actions may influence the field and its inhabitants' relationships. So, because of this, and because of issues regarding informants' privacy and the risk of exposing anyone to potential

harm as a consequence of their involvement in the research, I not only carefully considered my role when in the field, but also post-field, and by carefully scrutinizing the research product itself.



## Chapter 4. Theoretical approach

In order to build the research on solid grounds and secure validity, one must lay a foundation of frameworks, theories and concepts that will enable us to draw conclusions. However, it is important to be aware that some sacrifices may have to be made in order for the research to fit into these. Transparency, in terms of the choices made in order for the research to fit in when interpreting the collected data and turning it into scientific language, must be available for the reader to scrutinize. I will therefore now explain the theories and reveal the analytical framework that will enable me to answer the research questions.

I will start with the thesis epistemological basis before moving on to a short historic overview of the farming systems approach offered by Norman (2002), I will thereafter move into the main framework of the thesis; namely the farming system approach as suggested by Turner and Brush (1987). I will then attempt to implement the cultural aspects of a farming system with the help of Leaf (1987). Afterwards we will turn to the Green Revolution narrative(s) before moving on to Bateson's concept of flexibility and the chapter's final conclusion.

### 4.1 Epistemological basis

What is knowledge? How is knowledge created and how does one discover true knowledge?

These epistemological questions have embodied a great number of theories that all attempt to provide us with their own respective answers to these difficult questions. However, as Aase & Fossåskaret (2007) states, it is possible to divide these very different theories into two sections of theory; *the theory of correspondence* and *the theory of coherence*.

The followers of *the theory of correspondence*, state that there is an objective reality regardless of the presence of humans. This reality, represented for example as forces of nature, would continue as if nothing had happened, should humanity disappear. If one tries to grasp the truth, and knowledge about the truth, one has to look to the reality which is beyond the domains of the humans.

An interesting aspect to this theory is, like Aase & Fossåskaret explains, that the *theory of correspondence* has provided a tool to explain what "culture" is. According to this theory, the claim is that the practical human will adapt to the reality which is beyond the human domain; the original human thought will be defined by uncontrollable forces that ultimately leads the

original human thought through rational experience, to gaining knowledge, and ultimately, culture.

Now, not everyone would agree with this point of view, and would instead state that it is human beings who define and put meaning to the world, and therefore humans are the ones who influence the outer world through their knowledge, or more precisely, their cultural knowledge. And so we step into the world of the theory of coherence.

*The theory of coherence* claims that we can only grasp reality through our senses, defining the world from our own individual perspectives. This human based knowledge leaves us vulnerable to the fact that there will always be something that our senses may fail to notice, and that this will close the door for us to get objective knowledge about the outer world. So how do we manage this view in order to get knowledge?

Aase & Fossåskaret explains that one can for example manage the theory of coherence in order to gain knowledge as forwarded by sociology; *Understanding sociology*, seeks to understand the reasons for people's actions, and thus, people's *intentions* are duly explored - *What are we trying to achieve by our actions? Which premises are the basis for the chosen action?* In my case in Punjab, this translates into asking:

*Why does a farmer choose to fertilize his field with Urea despite being convinced that Urea is the source of multiple health complications in his village?*

Is the theory of correspondence closed to being able to answer questions like these?

Going back to the *theory of correspondence*, and representing *critical realism* related to the theory, will provide us with a far more nuanced picture.

Roy Bhaskar (1978; in Hansen and Simonsen, 2004; Sayer, 2006), who developed the ontological basis for realism, states that *realism's* ontology postulates that there is a real world, but that the real world's most significant components are not that easily recognizable to humans. This implies that there are systems and structures that we cannot measure because we are not able to observe them at first, the structures are lasting and they exist independently from us, we cannot recognize them because we lack the experience, knowledge and the right conditions for us to grasp their existence. Within this reality there also lie latent structures which may or may not create an event. The potential of these kinds of structures or mechanisms, may for example be prevented in any action because other mechanisms are

blocking any move. This would be Bhaskar's *real level of reality*, representing mechanisms which are not easily observable and contains the belief in the latent capacity of structures or mechanisms to cause events. Bhaskar presents us with two more levels of reality, *the actual* and *the empirical*, the actual, representing events which are observable and the empirical which represents events that one can experience.

The world is what it is, largely independent of what I or you might think about it. Sayer (2006) uses the Earth as an example of the meaning of this belief - it has always been round independent of whatever we might think it to be. Sayer's example serves as a very useful tool for us to show the nature/human relationship. As we all know, the popular discourse developed many hundreds of years ago with the belief that the earth was flat. This discourse is one of many examples showing us that our way of thinking and describing the world is constructed, and are major influences on how we shape our society and our geography.

We are all very influenced by available discourses, concepts, and perpetual schemata which will make it difficult for us to see the world for what it is. However, this should not be looked upon as being something negative, because in order to be able to build a base for our thoughts we need to be allowed to use certain tools, like discourses, concepts and such-like, so that we are able to see, think, and quite simply try to make sense of the world.

I have now established that discourses do shape people. However, as Sayer states, it might be too easy just to state that people are socially constructed since people are far more complex than that, and have certain powers and resistances that will affect the overall shaping. The knowledge of some phenomena can therefore only be discovered through the investigation of the human conception (Sayer, 2006). Can we, for example, claim that a farmer's actions are rational when he chooses to use Urea as a fertilizer, regardless of the fact that he is convinced that Urea is the source of multiple health complications in his village? When realizing that there might be several elements that influence the farmer's final decision to use Urea, one might be inclined to make the claim that the farmer actually is acting rationally.

What we can make of this is that our actions may be claimed to be rational, only if our action makes sense to the people involved (Aase, 1999b).

So if one now looks back at the brief presentation of the theory of coherence, where understanding sociology was briefly introduced, by stating that it investigates people's

intentions with their actions and which premises that are the basis for the choices they make, one might claim that the theory of correspondence, represented by realism, is also able to make a very similar and sensible investigation.

I will now leave the discussion about epistemology, soon to return for a brief conclusion at the end of this chapter.

## **4.2 A farming system approach**

In the mid to late 1970s a new understanding materialised and blossomed into the appearance of the farming systems research (FSR) approach. The view was that there was a need for knowledge of in-depth systems that would be capable of identifying farmers' constraints and needs in order to lay new foundations for the collaboration between farmers and technological and social scientists and their search for the appropriate technology implementation. Norman (2002), states that one can identify four phases in the evolutionary process of the systems analytical framework, each with its own respective beliefs (Norman. Ibid: p. 2);

“...which factors are considered endogenously determined and thus subject to analysis and modification, and which are taken as exogenously determined constants”.

Here endogenously determined factors are referring to variables, while exogenously determined constants are parameters, or constants.

Norman points out that it is important to note that a higher ratio of variables to parameters, are identified as we move through the different phases. Let us briefly look into the sphere of the four different phases and the evolution of the farming system approach, starting with the farm management of the 1960s to early 1970s, which will lead up to the first phase of the farming systems evolution.

In the early days, neoclassical agricultural economists dominated farm-management studies. Armed with normative views they produced large amounts of quantitative information. However, questions regarding the suitability of the research process arose, especially when also realizing that other aspects than profit were regarded as important for the farmers when evaluating farming strategy, thus falsifying one regarded truth in the economical world: That the rational actor will always go after the most profitable monetary solution.

It was obvious that researchers needed another approach. So in the 1970s to early 1980s, *the farming system with a predetermined focus*, an interdisciplinary bottom-up approach, was



implemented into the farm management studies. The new approach was based on the idea that one had to understand the farmers and their environments in order to enable the researcher to make a proper evaluation of the technological development.

In addition, biophysical and socioeconomic components were essential for the creation of a sound understanding that was ultimately expected to end up in good farming solutions. However, research goals were essentially determined by international farming research institutes and donor agencies, which had great influence on the development of methodology and the approach in general.

So, new on-farm research was done with a focus that targeted the productivity of a particular commodity, because the belief was that if one kept focus on farming systems dominated by one crop, one would have a better chance of improving the production of the overall farming system.

When phase two made its appearance – a *farming system with a whole farm focus* - researchers saw the necessity for the farmers to articulate their specific needs, thus enabling the researcher to identify constraints. Scientists were aware of the farmers' complex reality, and armed with new research methods and analytical tools, the researchers searched for flexible technology. Among other things, the approach provided a common ground on which technical and social scientists could cooperate better and make a better and more diverse understanding of the field.

Recognizing limitations in the approach, the 1980s and early 1990s provided changes. New methodological techniques were developed and farmers were invited to be part of every level of the research process. New improvements also opened up for a better systematization of farmers' input and an increased awareness for gender related issues. Much effort was also made in developing appropriate methods to analyze the results of on-farm research. Through farmer groups it became easier for the researcher to interact with farmers and investigate the farmers' own interaction. It became common to establish committees in the hope that this would improve information flow, etc. Also, the range of social and technical disciplines associated with the farming systems approach broadened. Towards the end of the 1980s an increasing concern about ecological sustainability and environmental degradation arose. Although aware that some of their activities would eventually lead to environmental and

resource-degradation that would decrease productivity, farmers on all levels tended to focus on short-term survival.

This leads us to phase three of the farming systems approach: *Farming systems with natural resource systems focus*. The focus towards natural resource-related issues has, according to Norman, taken two directions: 1) The development and implementation of methodologies to determine biomass flows in order to identify vulnerable elements in the farming system. 2) ecoregional research that aims to mobilize funding on natural resource management research coupled with improved productivity and environmental conservation. Research focus is here on regional problems.

Norman finds three challenges worth mentioning: Firstly that identified processes are manifested differently within regions; secondly, that implementation of remedies that will reverse and improve ecological and environmental damage takes time; and finally, the implementation of such remedies is likely only to be adopted by farmers if the initiatives will also improve welfare in the short-run.

The current phase in the farming systems is an approach called *the sustainable livelihood focus*. This post-development focus has been quite limited to each unique area or village where the approach has been tested, thus, application of the approach has been limited. Norman states that the term “livelihood”, refers to entities managed by households in order for them to ensure their needs, such as job opportunities, entitlements and social relationships. A second feature worth mentioning is that the sustainable livelihood focus requires a combination of analytical methods from many different fields of research in order to create a sustainable livelihood focus.

The last feature of the sustainable livelihood focus is that it links technological change within the household level with changes happening at the meso and macro levels. The sustainable livelihood focus aims to define problems, identify opportunities and make it possible to combine indigenous and modern knowledge. The main goal is to improve short and long-term productivity, while at the same time protecting the environment and securing an improved standard of welfare for everyone in the community. Norman refers to Chambers (1991) when stating that the properties of new technologies that would satisfy these criteria should focus on

ensuring farmers` flexibility to adopt their production and livelihood system to whatever change.

### **4.3 Turner and Brush`s approach**

In their book “Comparative Farming Systems” (1987), Turner and Brush provide an approach for conducting research on farming systems. Here, highly diverse samples of 12 primarily original case studies of farming systems are presented, ranging from a highly technological cooperative computer farm, to a case of swidden cultivation in the Amazons.

The farming systems approach is used for: 1. to provide case studies that describe a representative range of world agricultural systems; 2. to provide a sufficiently consistent set of data from which comparisons can be made; and 3. to address some of the forces of change acting on the systems. (Turner and Brush. Ibid.p.1).

Although the aim of this thesis is not to compare it to other case studies, it may still be regarded as suitable for comparison to other studies and a study that hopefully is able to recognize and address factors of change acting on the system.

Despite the need for a standardised classification system for agriculture and efforts in doing so, the many end results have created a lot of systems that are not capable of embracing every system`s uniqueness. This, as stated by Turner and Brush (1987), has ended up with one classification perhaps referring to plantation agriculture as well as wheat-rice cultivation.

Another critique to attempted classification systems is that their usefulness in comparative analysis and testing is limited because focus is on the differences among agricultural systems and that the great diversity of interest in agriculture also complicates the development of a standardised classification system.

Turner and Brush offer a classification scheme intended to be suitable for all cultivation systems. They base their scheme on three universal components of farming systems, which are claimed to be unaffected by “...environmental, cultural, or socioeconomic conditions. Changes in farming systems typically involve changes in these components. Indeed, the three components are so closely linked that a change in one of the components generally signifies a change in the other two as well” (Turner and Brush. Ibid. p.6)

The three universal components are; *Output intensity, technological type, and production type*. Based on these three groups Turner and Brush divide farming systems into three different systems, namely; Paleotechnic and consumption systems, mixed technic and production systems, and neotechnic and commodity systems. In order for my case study to be suitable for future comparisons, efforts must be made to place the study into Turner and Brush's categorisation scheme, and this is what I will do in chapter 5 when presenting my findings in the Punjabi village "Pind".

The categorisation; *Paleotechnic and consumption systems*, refers to farming systems that produce low levels of output intensity and is dominated by paleotechnic inputs. Production in this category is largely focused on production for consumption. The second categorisation is *mixed technic and production systems*. The systems placed in this category show great variability - in output intensity, in the use of paleotechnic and neotechnic inputs, and in production for consumption or commodity. The third categorisation is the *neotechnic and commodity systems*, which are systems that produce for the market with the help of pure mechanization (neotechnic input). Although there are differences in output intensity among the systems placed in this category, they may all be regarded as producers of high output intensity. (Turner and Brush. Ibid.p.9).

Some kind of standardised universal system for measuring *output intensity* would have been useful. This would have made comparisons much easier. However, as this is not the case, and that there are many ways of measuring output and its intensity, then the choices made could potentially have an effect on the conclusions that are made, as we shall see in chapter 5.

Let us now move forward with the framework of the thesis.

Turner and Brush states that:

"Farming Systems is a loosely defined, interdisciplinary approach to the study of agriculture that has developed, in part, as a reaction to sectoral and disciplinary approaches. The fundamental premise is that the understanding of agriculture is facilitated by a holistic perspective that integrates the socioeconomic, political, environmental, and technological elements of the system. Emphasis is placed on the micro- or mesospacial scale, the farm, the village, or a small area as the object of analysis". Turner and Brush (1987.p. 3).

Since the integration of the Green Revolution, Punjab has experienced that political incentives to improve agricultural production and the farmers' welfare has culminated in depleted soil and water resources. The interests of the government and private businesses are heavily integrated, directly or indirectly, into the farmers' lives. The need for a holistic approach, implying the integration of relevant elements like socioeconomics, politics etc., into the overall agricultural system, focusing on more direct farming elements like water sources and soil is much needed.

However, although there is will to implement different lines of analysis into one single approach amongst scientists, the traditional approach of dividing agriculture into several parts is preferred. This is due to the great complexity of agriculture that creates the need for an overwhelming knowledge base (Turner and Brush. 1987).

The fact that the researcher needs to limit the area of analysis does bring some implications to the correctness of the presented research. Surely it is a fact that several interrelated areas of research and elements in society has a direct or an indirect impact on a farming system. However, for one researcher to try to recognize and analyse all aspects in farming systems recognized in the agricultural academic milieu, would be quite time-consuming and would not be a good solution.

In this thesis I will focus on farming systems units like water, soil, fodder and the like. However, the need for contextualisation of socioeconomic, political, environmental, and technological elements of the system are recognised, as these can all be claimed to have major limiting factors on farmers' flexibility, because of their impact on the farmers' production and products, despite the intentions of the reverse effect.

Although individuality is held high in the village, emphasis in this thesis will be on the village as the unit of analysis, this is due to the Co-operation society that unite the farmers and their production. Farmers' efforts to reverse negative impacts on their farms, for instance with the aid of other farmers through the organization of borrowing/renting agricultural machinery, or the informally organized water management of the channel water for irrigation are other factors that justifies a village focus. Another aspect that might be worth mentioning is, as stated by Leaf (1987), that the Green Revolution depended on the farmers not being reliant on

local resources but would instead have to rely on regional resources, indeed a claim that can even be made today.

However, the household level must not be forgotten, as this level is important in terms of the farmers' economy and is part of the enablement of the farmers' flexibility.

Turner and Brush (1987) states that a farming system comprises several subsystems, and they highlight human, environmental and genetic subsystems as three major subsystems generally referred to in the field of agriculture. Turner and Brush point towards these three subsystems together forming a single farming system. (Turner and Brush. Ibid. p. 13) The *human subsystem* focuses on rules in resource use, labour intensity and availability, human demography, communication and diffusion of innovation, the relation between social and economic units, consumption variables, decision-making, and links between these features and the environmental subsystems. The *environmental subsystem* is primarily studied by earth and agronomic sciences. Issues they investigate are for instance water and soil. The *genetic subsystem* is focused on the biological issues comprised in the farming system, for instance animals and plants.

In this thesis I will focus on the human subsystem.

#### **4.3.1 Culture and the farming system**

But what about culture? Surely cultural aspects must have some impact on farmers and their management of their farms? The Green Revolution has indeed made its impact on the state's agricultural decisions, but culture and religion also seem to be factors in the farming system.

It is stated in the Economist 2nd February 1991, were an anonymous person shares a piece about how the Hindus' old economic system of caste now seemed to have changed due to the effects of the Green Revolution. Anonymous claims this to be especially evident in the great Punjab, where the former agricultural manual labour done by the Harijan castes seems to have been taken over by mechanisation, thereby altering the earlier form of social interaction.

The author claims that the Green Revolution has not only increased Punjab's food production but has also ultimately led to a population increase and a reduction in the demand for labour to harvest the crop. He also claims that the population increase has meant that there is simply no longer enough land for new generations of either Jaats or Harijans. So the Harijans seek to

the cities or migrate, whereas the Jaats remain, and are increasingly dependent on machines. Although Anonymous' text is too short and simple to make a strong case in its claims, the author does make an interesting description of the situation in Punjab. Anonymous highlights the importance of being aware of cultural and religious aspects in a village society that can ultimately be claimed to have an effect on the farming system.

In chapter 5 I will look more closely at the importance of culture and religion, but for now I will focus on the cultural framework of the farming system of the village. We will now turn to Leaf (1987.p.250) who argues that activities are organized by a cultural information system, which is defined as;

“...consensual network of ideas related by learning and habit to a set of conceptualised objects”.

Leaf continues by pointing out that Punjabi villages in general contain six cultural information systems: 1. the village ecology 2. the management system 3. the economy 4. the kinship system 5. the system of political ideas, and 6. the system of religious ideas.

The first three are stated by Leaf to describe the farming system, while the last three are described as “...defining modes of interpersonal relations, virtues and vices, social groups, and gods”. (Ibid.p.250).

As stated earlier, the Punjab government has founded its government of the state on the Sikh religion, thus making this the basis for the overall development of the state. In general, this makes the whole society bound to *the information system of religious ideas*. For our interest though we must focus on the village level.

Leaf describes *kinship* as the only reliable form for securing an individual's safety because of the lack of an effective governmental system of security in the village. Family is therefore important to consider when making socio-economic decisions, such as spending money on farming investments, children's education, or the decision to migrate.

Leaf (1987) describes the *political ideas* that define political parties, as providers of a framework for debates and understanding of power-relations based on kinship and religion. All these factors bind society together as it provides a common understanding of the social

organization, and will function as a framework when implementing culture into the farming system as a whole.

#### **4.4 A Green Revolution narrative**

Roe (1991) describes a narrative as a traditionally composed story with a beginning, middle and an end. The typical narrative has its hero, victim and villain. The narrative will point out the causes and effects of what is to happen in the end, and in this lies the remedy to fix the problems that the story has highlighted. Here I will present two dominating narratives in the food security debate.

It seems difficult to make a case from Punjab without also debating the Green Revolution. This revolution has been heavily implemented into Punjabi farming, and the dominant narrative has sung its praises.

When the Green Revolution made its appearance planners and the world community saw some hope of a solution, claiming that it would end the world's food problems. But the Green Revolution has been the source of much debate. There seem to have been established two divided ideological groups, one that follows the solutions offered by the Green Revolution, and one that puts its faith in traditional farming and claims that the Green Revolution has mainly caused difficulties to both farmers and resources. Shiva is one of those who argue heavily for the view that organic agriculture is the best option if one would like to have a sustainable development.

Shiva (Norling. 2008) is not the only exponent for the need of a change in agriculture. Among others, Patel (2007) heavily criticises the Green Revolution. Their claims are that the Revolution has injured India by ruining the country's self-reliance and biodiversity, which has thereby reduced food security. They strongly claim that India's farmers have suffered because of the Green Revolution and that they can no longer decide which crops they should grow. On top of this it is also stated by Shiva (Norling. 2008), largely supported by Patel (2007), that the claims that the Green Revolution creates higher yields is untrue. They claim that the estimates the Green Revolution present for greater food production do not take into account the food that is no longer produced as a result of the Green Revolution. Based on this, the conclusion is that the Green Revolution has ultimately not given us food security, but has instead given us fewer crop options. Among other things, this means that farmers, and ultimately the state, have lost much flexibility, not only concerning cropping techniques and



independence from large farming corporations, but also concerning their ability to survive through floods and droughts, and still manage to make some profit from their fields.

But there are also other claimed limitations to farmers' flexibility caused by the Green Revolution. Among these is the fact that if the farmer is so unfortunate as to choose a crop that does not function well on his land, or something else goes wrong, he will fall into debt. If this happens, there will be a strong possibility that the farm will fall into the hands of the bank and the grain distributors, and that the former owner will be degraded to become a laborer who has to lease his own farm. Naturally, a farmer would do anything to prevent such a situation and this gives more power to the corporations who then can decide what is to be produced and ultimately, what the consumers are offered.

Patel (2007) states that since most of the seeds of wheat, corn and rice is in the hands of large agricultural corporations, then these also have the power to control the farmers. Patel accuses the market of deciding what kind of crops the farmers should grow in order to receive payment for their work, and it is therefore the market that decides how the farmers are to run their farms. The market is in fact claimed to be the dominating factor of a whole system which eventually decides the complete process of food production and what will be served at our dinner tables. Patel (Ibid) claims that the government of India is indeed part of the market power structure by deliberately allowing millions of tons of food to be destroyed, presumably to keep the market prices high.

The Green Revolution is not only criticized because of its incapability to solve world hunger. Shiva (Norling. 2008) also states that it is causing more pollution. She claims that industrialised agriculture constitutes 25 percent of the world's greenhouse gas emissions, and that it requires ten times more energy-input than it gives back in food production. She also strongly hints that the chemicals that are used in this production process are responsible for the high cancer rates among farmers. She also criticizes the economic interests that create starvation by monopolizing nourishment production. Shiva claims that the world's food is controlled by 5-6 corporations, and she mentions the Monsanto Corporation as an example. Monsanto has heavy interests in industrial agriculture, and Shiva claims that they control most of the world's newer seeds.

Norling (2008) writes that Shiva blames the scientific myths that many scientists follow as being one of the reasons why bio-diverse ecological farming has not been given more

acceptance. However, Shiva's ideas about bio-diverse ecological farming have been tested by Navdanya, a movement that sees organic farming as the solution to coping with the possible climatic problems. The over 300 000 "test" farmers are all devoted to her farming ideas, and they are claimed to have twice as much production, and three times more income than those who base themselves on industrial farming. Shiva claims that this success is due to the fact that "biodiversity produces more and ecological farming reduces costs and increases productivity." (Norling, 2008. p, 21)

But not everybody agrees with this ideology.

The Green Revolution followers are, on their side, eager to demonstrate that the Green Revolution actually has strengthened food security, and that the technology is in fact giving farmers more elbow room, because of higher yields, and that more technology will be able to handle any developing problems.

The Green Revolution's instigator, Norman Borlaug, is claimed to have succeeded in creating a high-yielding, short-stemmed, disease-resistant and fertilizer-responsive wheat (Jawanda.2008). This science ended up with creating a massive improvement in production yield and gave several countries the ability to sustain themselves. However, in the aftermath of the revolution, critics have argued that the many investments demanded in the use of Green Revolution techniques have led farmers into debt, and some to suicide. Julie Borlaug, daughter of Dr. Borlaug, claims that economic stress factors affecting some farmers are not caused by the Green Revolution. Instead, she claims that the difficult reality of some farmers are said to be caused by their own governments, who show a lack of will to attack the problems (Ibid).

On the claims from environmentalists that there is no need for agricultural Green Revolution inputs to remain self-sufficient, and that the Green Revolution chemical inputs are unhealthy, Julie Borlaug states that such claims show a lack of knowledge based on ungrounded fears. Borlaug claims that these critics are in general wealthy people who are promoting the anti-GMO products (Genetically Modified Organism). The environmental elitists are claimed to be denying the farmers of the developing world the tools they need to prevent starvation. The organic farming solution is stated to be insufficient. There is, for example, simply not enough manure to sustain a growing population with organic food. Furthermore, is the fact that the animals needed for manure would also need to be fed, and much of the product would therefore be consumed by cattle.

Lipton (2001) states in his work on poverty and nutrition research, that the world is, in principle, producing enough food and that the problem is the lack of entitlements, which is why we are still experiencing famines. The lack of individual entitlements is in fact leading to the over-nourished becoming overfed and the under-nourished remaining under-nourished. The fact that farm animals also consume much of the food produced does not enforce a fair distribution of food. Further problems are admitted to when stating that food staple yields have declined and that water scarcity is a growing problem. The claim is that handling the problems of food entitlements will improve development and should be done by “restoring, despite water shortage, the faltering growth of staple yields; achieving less unequal distribution of land” (Lipton.Ibid.p.205).

However, by pointing to scientific and technological advances experienced through history, he points out that food production has always been subject to improvement. History has also showed us that new technology in agriculture, such as irrigation, has improved nutrition, incomes and health. It is also said to have provided employment whilst reducing the work load. The rise of the Green Revolution is no more groundbreaking than was the technology that was already established before its appearance on the agricultural scene, the difference lies only in the extent and speed with which it has made its impact on agriculture. The reduction of problems like under-nutrition has become an expectation because of scientific advances made during the years, and Lipton claims reduction to be achievable through further “...scientific advance and reasonably competent health and economic management...” (Lipton.Ibid.p.205).

However, yield potential is claimed to be threatened by falling international interest in sponsoring agricultural yield research, and by bad policies. Another fear is the growing belief in organic farming, which he claims to be on a par with astrology (Lipton. Ibid.p.205), and will threaten possible future solutions to agricultural problems.

The water scarcity that the world faces is indeed recognized by Lipton. The falling groundwater tables and the presumed scarcity of water due to expected climate change is a growing concern. The fact that agricultural production is shrinking but still needs very high levels of commercial water is claimed by Lipton to direct policies towards leading available water to other sources than agriculture.

Lipton sees transgenetics as a tool to solve the problems that have come to the surface in the aftermath of what he considers to be the failed management of the Green Revolution. (Note

that he aims towards providing good solutions for poor smallholders). For instance, organic food staples that have adapted to stresses by natural selection have not given higher yields, and so the staples would reach a higher yield potential for less water and nutrition, if transgenetics got the opportunity.

Lipton notes that although transgenetic admittedly is in the control of a few private companies, we should remember that these companies are nonetheless dependent on good relations to everyone involved in the different levels of production. And since they do sit with the control and much of the possibility (and funds) to do research on transegenetics, it is also vital that public research will be able to participate and redirect the research into practice.

The two narratives presented are indeed present in the farming system of Pind. It is therefore important to be aware of the ongoing debate when considering farmers' potential for flexibility. Especially when realizing that the farmers seem to have gathered elements from both the two different ideologies in order to make a farming system that is in their interest.

#### **4.5 Bateson's concept of flexibility**

Flexibility is defined by Bateson (2000: p.505) as:

*"Uncommitted potentiality for change."*

Bateson forwarded a definition of healthy ecology in human civilization, in which he suggested that human civilization should be seen in relation to the environmental system. In this system both the environmental and the human civilization's flexibilities should combine to create a complex system that is open for change without causing the system to collapse.

Let me elaborate

Bateson refers to Ross Ashby when he proposes the assumption that the system that combines the ecological environment and human civilization can be described as linked variables. Each of these variables has its own tolerance limit and each variable has its own two borders; one for the upper level of tolerance and one for the lower level of tolerance. An example could for instance be if there should be a flood or if we experience water shortage.

As the observant reader sees, to cross one of these borders may prove to be devastating.

Luckily the variables have been given space to move within its respective limits in order to adapt to change.

But this does not mean that one should use this “space for adaption” as an excuse to relax our efforts. Bateson states further that a variable is in fact lacking flexibility when exposed to stress, the values rise or fall to one of its limits. This means that if a variable moves upwards or downwards to a value close to either of these thresholds it is in fact losing flexibility. This seems simple enough, but here is the twist to Bateson’s concept; Recall that the variables are linked, which means that one variable cannot move without the others being affected in some way, as Bateson (Ibid: p, 504) states.

*”The loss of flexibility thus spreads through the system.”*

Bateson claims that in some cases a system will try to change a variable’s limit by pushing the tolerance limit in the hope of creating a more comfortable situation by making changes that in the end will only push the tolerance limit even further.

It follows by this that flexibility is to be found in the variables’ ability to move freely in order to adapt when faced with a challenge, thus a sustainable system is ensured.

In this thesis Bateson’s flexibility system is translated into a farming system context, the linked variables constituting soil, water, dung, wage labourers and other variables that are the basis for the farming system, and these function as described above.

#### **4.6 In conclusion**

As I now have gone through the thesis’ theoretical framework, I would like to ask the reader to think back to the epistemological discussion held in the beginning of this chapter. Doing this it becomes apparent that we should be well aware that the world is far too complex to be realistically represented as a discourse or in a model, and recognizing the usefulness of being able to simplify the world through discourses and models and the structures and mechanisms that bind elements together, the farming system approach that is at the basis for this thesis seems to fit quite well into the world of realism. The Green Revolution narrative that has dominated the great Punjab for years, with praises of its success, is also needed to be acknowledged for its suitability to make a basis for a debate, even though the narrative cannot be claimed to be a replica of the real world.



## Chapter 5. The village of Pind

Aase and Fossåskaret (2007) state that the researcher is working through a double hermeneutics where he interprets information from informants who share their own interpretation of incidents with the researcher. When dependent on a translator the researcher experiences a triple hermeneutics, where he not only has to interpret the expressed reality of the informant, but also needs to be aware of the middleman/woman who is a part of the interpretation of the information, thus ultimately affecting the original information with his or her own interpretation.

The hermeneutic thought might be better described as equivalent to Chinese whispers (Tompsett 2010, p. 76), the game where someone whispers a story to a friend, who then whispers the story to another friend etc., and where the last person in line will then recite the story told in a way that will be unrecognizable to its initiator. One must therefore be aware of the research's limitations when it comes to trying to understand and interpret other people's reality, because certain metaphors, categories and the like can get lost in either translation or because of the researcher's general ignorance.

One should also be aware that people's experience of the world and its realities are often quite diverse. One farmer may for instance claim the channel water to be of superb quality, while another farmer might state that the water is in fact highly polluted. Thus, the researcher's challenges are plentiful when trying to produce data for the thesis.

Aase and Fossåskaret (ibid) state that the research process mainly contains two levels; the Emic level and the Ethic level. The Emic level is when the researcher tries to grasp the informant's understanding, to recognize and grasp local categories, the local terms and the local way of understanding and interpreting. The Ethic level is where the researcher translates these understandings into scientific language.

The Ethic level is used due to the necessity of creating a common language and understanding between the researchers. This is achieved by the use of formalized terminology and chosen theories that give a common base for debate and comparisons. In this chapter I will give a

brief presentation of the process of analysis before presenting the findings from the village of Pind.

### **5.1 Producing data**

A category is where we group our variables. But before we split our data into each respective category we need to make certain decisions. For example, what do we mean when we refer to the category “farmer”, in the farming system?

It is important to be aware of such things when conducting research, and perhaps more so when conducting research abroad. For instance, in the beginning of my field-work I did not know that the Jaat caste was the only caste in this particular village who owned land. The fact that this caste was the only caste in this village to be regarded as farmers came as a surprise and altered my categorical understanding of what a “farmer” actually was.

Thus, although farmers use the same label as I to describe a category it does not mean that we have the same understanding of the label’s meaning. However, we can analyse cognitive categories in a cultural context. Cognitive categories can be described as thoughts and ideas that have been divided into several categories in our mind, thus creating meaning and an understanding of the world. For us to be able to put some meaning and concept to a certain category we are dependent on some kind of experience with what is to be categorised.

Aase and Fossåskaret (2007) states that cognitive science has proved that categories are put together by four elements, namely, objects, senses, mental capacities and culture. The three first elements are perceived the same way by all humans, regardless of their cultural background. It is the cultural element that signifies our ability to perceive things differently.

However, it is important to note, as stated above, that people who share the same cultural background do not necessarily agree upon what meaning (concept label) one should put upon a category. People do categorise differently and may not agree on how to label a category. But they can also be the owners of categories one has never heard of. Wadel, in Aase and Fossåskaret (2007, p.116) points out the importance of being careful regarding these issues when attempting to describe another person’s reality, because of the danger of unknowingly making use of one’s own categories instead of those of our informants. Lakoff and Jonson (1980, p.5) describe metaphors as a way of understanding and experiencing one



thing in terms of another. In fact, when referring to abstract concepts the two scholars state that, “The concept is metaphorically structured, the activity is metaphorically structured, and, consequently, the language is metaphorically structured.” (Ibid, p.5) They continue by pointing out that metaphors are not only part of our language, but also part of our way of understanding and our subconscious mind. Because of this, metaphors are also determinants for the way we are and how we deal with our surroundings.

Lakoff and Johnson (Ibid) continue by stating that linguistic evidence has found that most of our conceptual system is metaphorical. They point out that we are not normally aware of this, and so our actions and way of thinking are normally not given as second thought. However, Lakoff and Johnson (Ibid) state that our language is a tool that will help us to find out why we do the things that we do and why we think the way we do.

Aase and Fossåskaret (2007) state that metaphorisation is a way to structure categories. Here one puts two categories together in order to describe one with the other. This can be put into the equation  $A=B$  where A is the unknown category and B is the known category we use in order to be able to describe the unknown category A. Hence, we do in fact translate our experiences and knowledge about our known category into describing the unknown. However, as Aase and Fossåskaret points out, the cultural aspect regarding transferring knowledge this way should be duly noted.

Aase and Fossåskaret (Ibid) explains by the example of  $A=B$  where the category “mother” is A (the unknown), and “Cow” being B, (the known). They then point out that in Norway the cow is regarded to be quite a stupid animal, whereas in Nepal it is regarded as a holy creature.

Aase and Fossåskaret (Ibid, p. 144) state that if we “analyse the categories, metaphors and concepts used by our informants in interviews and field conversations, it will enable us to grasp the informant’s way of thinking. It will further help us to grasp knowledge hidden even from the informant”. A tool that is helpful in doing this is the semiotics developed by C.S. Peirce, referred to in Aase and Fossåskaret (2007, p.144-145).

Peirce states that there are three types of *signs*.

Firstly we have the *icon*, which are signs that look quite similar to the objects they are intended to inform us about. An example could be a photography.

Secondly, we have the *index*, which is something that relates to an object by indications and evidence. An example could be several dried out wells. These wells will then be indexes that can tell us that farmers are having an issue regarding the groundwater.

Thirdly, we have the *symbol*. A symbol has no direct relevance to the object it refers to. The only thing that actually ties a symbol to an object is the fact that there is a consensus that a certain symbol has a certain meaning. An example of this can be the apple that symbolises the Apple software company.

A symbol has a direct meaning, which is called the symbol's denotation. This can for example be found in a dictionary. An example could be the word white, which is a colour. However the word white has also other meanings associated with it, and this is called the symbol's connotation. In my culture the connotation to the word white is often equal to being sick or frightened. Telling someone how white they are can be regarded as quite impolite in Europe since the perceived ideal for beauty is to have a nice tan. This generally symbolises good health and extensive travels, and thereby a good economy and a high status in society. Hence the connotation to the word white is quite negative. It is interesting, however, to note that the word was regarded as quite positive in India, where friendly villagers would often compliment me by telling me how white I was, since light skin is regarded to be quite beautiful in the east. Thus the importance of being aware of certain cultural differences regarding words and meaning was important.

Identifying categories, symbols connotations/denotations, structured metaphors (as described above) and the informant's status, is a receipt for getting a better understanding of the answers informants give.

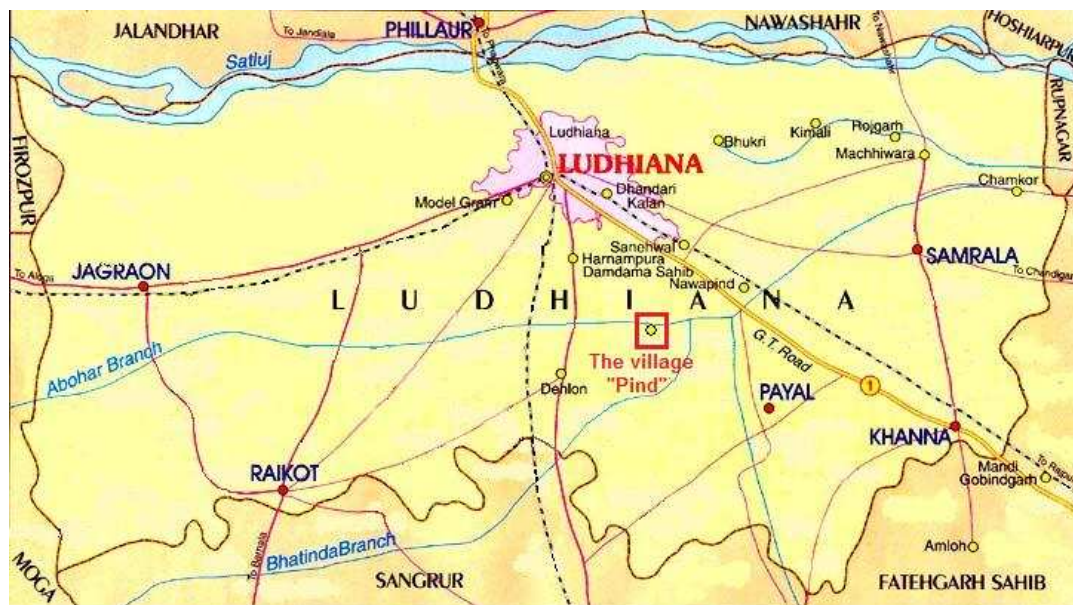
The difficulty language-problems caused during my fieldwork probably resulted in some details getting lost in translation. However, I did in any case find that being aware of language and its deeper meanings useful, for example when scrutinising culture versus farming system and flexibility. However, when mapping the farming system, emphasis was on the farmers' practises. The fact that I have also had to rely on secondary sources in order to paint a full picture of the farming system also limits the need for engaging in metaphors and such-like.

After this brief presentation of analytical tools, I will continue with an overall presentation of the village. I will thereafter present my finding. As stated earlier, secondary sources have been

implemented in order to be able to provide a satisfactory picture of the farming system, as well as the cultural system. Unless duly noted, all data referred to in the following is collected from Pind.

## 5.2 A brief presentation of Pind

Situated about ten kilometres from the national highway leading from Delhi to Lahore in Pakistan and a forty minute drive from south of Ludhiana city, where the urban landscape changes to wavy fields of green wheat and yellow mustard, and where scattered villages lie clustered like small dots in the flat landscape, lies the village Pind.



Map 5.1: Ludhiana district in Punjab with the village Pind

Here a channel, fed by the great Sutlej River, runs close to the village as it has done ever since the British decided to improve agriculture with the aid of irrigation channels. Upstream there is a dam with an old, closed down complex for electricity production from back in the days of British rule, where a new complex for electricity production is now being built.

A narrow stretch of government-owned forest consisting of old eucalyptus trees borders both banks of the channel. Here shade is provided for the village's many chained buffaloes. The narrow forest also serves as an area where animal fodder is stored, and where several man-made bee-hives are placed for honey production, and where the honey-workers work and have their sleeping quarters. The forest also serves as storage space for wheat/rice residue and piles of dung-fertilisers.

Farm machinery is stored in close proximity to the village, and large piles of dung-cakes that are placed in squares and piled on top of each other to form tall pyramids are stored wherever possible. Parallel to the narrow forest there are endless flat fields that decorate the landscape with wheat, mustard and a clover-like plant for fodder called berseem.

Several narrow, brick-paved irrigation channels stretch along the fields, criss-crossing at right angles. These channels feed the fields with water as well as acting as channels for residue water. This system hinders floods by leading water back to the main channel. Water flow can become quite stagnant in the channels meant for residue water and this allows thick green vegetation to grow, but also means that huge piles of litter are allowed to gather since it is not washed away.

Several small sheds are scattered about the fields for tools and the groundwater pumping system. Several dried out water wells lie close to each shed. In the distance one can see the contours of other villages. Several brick kilns are spread around the landscape with their chimneys standing high above the plain as they spout their smoke into the air. In this industrial area, temporary brick sheds have been made for migrant workers, mainly from the Utthar Pradesh. Here and there in the landscape a few gypsy migrant workers have made temporary houses made of dried hay.

The houses in the village vary in size and decorative details. Some new houses have already been built and others are being constructed within the village cluster. These houses stand out



*Picture 5.1 Clustered housing area*

significantly in their size and the scale of wealth they reflect, and belong to families who have migrated and their family members, or are used by migrated villagers when returning home for their holidays. A few of these extensive mansion-like houses have been built just outside the clustered housing area. Every house in the village is surrounded by high walls with broad gates which each

family locks and shuts at dusk.

Two Gurdwaras are situated in the village. One is placed at the lower caste part of the village and is referred to as the Gurdwara for the poorer Sikhs, while the other is placed in the Jaat caste part of the village. A third Gurdwara has recently been built on the other side of the river, and has become quite popular as a place for religion and as a general social arena.

Farmers gather on a daily basis at “the usual” meeting places situated in the Jaat caste side of the village, where they play cards, talk and socialise.

On the outskirts of the village there is a fenced off area for religious cremation ceremonies. A small mosque is also situated in the village and a larger one is being built nearby. The village has one public school where children between six and thirteen years of age attend classes. English is not part of the curriculum. Privileged children are able to attend a private elementary school about half an hour’s drive from the village. English is taught at this school which also provides the children with a sound knowledge-base for possible further education, either abroad or at an Indian university or college.

A university for technology is situated about a half an hour’s drive away from the village, and is a popular place for study among the village residents. A new private college has been built near the village, and has provided a source of income for a small café and a store that offers hair-cuts, recharges for mobile telephones and copy-machine service. This area of the village serves as a social arena for young men.

The village has a few small stores with a limited selection of products to choose from. There are food shops, fabric and tailor shops that use manual sewing-machines, telecommunication shops that recharge mobile telephones and one jewellery shop that also happens to be a car-repair shop. Farm machinery has provided a sound basis for several mechanics in the village. Two banks are situated in the village although they rarely seem to be open, and a chemist is also situated in the village. The Co-operation society’s head-office in the area is situated in the lower caste side of the village and offers machinery for hire, sells fertilizers and pesticides, and gives loans at a low interest rate. The village has also got a few pasteurisers and millers. A gravelled cricket field lies next to the elementary school, and boys and men gather there for informal cricket matches. The field is also used for the annual sports tournament where competitors from other villages come to compete in the game of cricket as well as the famous

local speciality known as Pind wrestling. The winners will receive prizes of a considerable amount of Indian Rupees that have been donated by local farmers. The tournament is a show of pomp and circumstance since important local and regional politicians and dignitaries also gather there as V.I.P guests. The area for sports activities is meant only for the male gender, as I learned first-hand when I asked to join in a game. Females are not welcome, neither as competitors, nor as spectators, although some leeway has had to be made since some of the elected members of the Panchayat (the village council) are females.

Next to the sports field lies a large paved area where seasonal market fairs are held after each harvest. Apart from the hundreds of dung-cakes drying in the sun, the area is otherwise unoccupied and lies empty in the periods between the market fairs. The village has its own office (*patwari*) where one can find historical records, records of households, population and old village maps. However, getting the office to open is not easy and getting information is even harder.

### **5.2.1 The villagers**

A small group of Muslims inhabit the village, but the villagers are mainly followers of the Sikh belief. They are segregated into several categories of caste and kinship/clans which work as guidelines for conduct and social intercourse among the villagers. Before I elaborate on these topics, I must make it clear how important these issues are in the village life. When someone presents themselves they not only tell us their name, which often also indicates their caste, but also their religion and which kinship they belong to. For example, a man could present himself as Jatinder Singh Gill. Singh is the name that all male Sikhs bear and which means lion or prince, Gill refers to his kinship or clan. A girl's name also shares the same distinctions, although instead of Singh, every Sikh female carries the name, Kaur, which means lioness or princess.

Kinship in terms of clan is quite the equivalent to the clan system of the Scottish people. The village of Pind is a Sikh Jaat caste village of the Gill clan. The blood line of the family is handed over through paternal lineage. The Gills believe themselves to be direct descendants of royalty, the prominent landowning clan of Rajput and a major ruling warrior group of the Kshatriya in the Hindu caste system (see chapter 2). Along with other Sikh clans and Jaat clans, the Gills are highly renowned for their bravery and warrior skills. Among many others, also the British have greatly benefitted from this.

The Jaats are the highest caste in the village. This caste is an agriculturalist subcaste (Baxter, et al.1998) of the Vaishya varna. When presenting themselves as a Jaat, they signal that they are from a caste that consists of good farmers who own land.

The Makhans are referred to by villagers as schedule caste. The Makhans own their own shops and often work as house builders.

The village's lower castes are Naii, who are barbers, Dharga, who sell clothes, Johr, who cook and prepare food, and Harijans. Harijan are referred to as the casteless. The Harijans used to be called Chamars, which means “to work with leather”. The Chamars are referred to as makers of dung-cakes and cleaners, often as cleaners of sewers. The law states that it is illegal to use the term “Chamar” and some villagers feared that I would accidentally have a slip of the tongue and call someone “Chamar”, which could then have got them into trouble and possibly imprisoned since they were responsible for me.

As a means of reducing social differences and social stigma, the lower castes and the casteless have by law been granted reserved places at colleges as well as in work-places, and such. However, this law is strongly debated since many do not consider it to be just since there are also many so-called high-castes who do not enjoy wealth or property.

Whatever the case, the Harijans, who in earlier days were referred to as untouchables, are apparently still branded as such in the village. The village is divided into sections with the Jaats situated in one section and the schedule and low-castes in the other at the opposite side of the village, the Harijans are situated outside the village cluster. Although there might be exceptions, the different castes in the village keep to the streets situated on their own side of the village, thus obeying the accepted social rules and structures of conduct.

### **5.3 Classifying the farming system of Pind**

I will now use my findings to classify the village Pind according to Turner and Brushes (1987) classification system as described in chapter 4.

There are some problems regarding measuring the *output intensity* of Pind, since measuring output intensity in monetary terms would for example imply a loss of documentation regarding the many kg of wheat that are used for consumption.

Another problem is the fact that rice and wheat, which are the main crops cultivated in Pind, are sold under the fixed price system, which may vary from season to season. However, this entails that the farmers are mostly bound to these prices, even though some middlemen do attempt to press prices due to the farmers' lack of storage space.

Also worth noting is that the government claims tax from the farmers' output. However, due to difficulties in collecting measurement on kg per killa per year, and difficulty in overall communication for getting further details, a general monetary measurement will have to suffice.

In general a farmer is said to earn between 15 000 to 30 000 rupees per killa per year. But the earning could potentially be more, as stated by a farmer who claimed that the food (especially wheat) that goes into subsistence is quite monumental. Another factor worth mentioning is that most farmers cultivate fodder for their animals, and thus some potential production output per killa, or rupees, is lost.

Also worth mentioning is the fact that although the Green Revolution technology is claimed to have provided higher yields, the technology is not invulnerable since a weak monsoon can potentially degrade the crops and give the farmer a lower income since payment is based on quality as well as quantity. Important to note here is the fact that the farmers of Pind do not regard drought situations as being a threat per se, because they believe that they have enough water in the ground. The problem regarding drought is that the crops then need to be carefully supervised which means more work for the farmer, and any mistakes they make cannot be reversed should the farmer be so unfortunate as to water his crop too late.

Many farmers sell their top soil to brick kilns. Leasing their land to brick manufacturers means that no cultivation can be done during the lease period, and when the farmers get their land back the soil is depleted. Hence, there is earning from the land but there is no crop production. The village's output intensity may be referred to as high. All the fields are in use most of the year and one cannot see a single patch (except for land leased to brick kilns) that is not in use. Input intensity is also high. However, farmers state that the output seems to be declining due to soil depletion and because of the farmers' incapability to change seeds every so often.



*Technological type* in Pind can be claimed to be a mix of paleotechnic and neotechnic inputs, although leaning somewhat more to the neotechnic side of the scale. Turner and Brush (1987) states that paleotechnic systems mostly use human labour, and that neotechnic systems depend on inputs that reduces the time farmers need to spend in the fields, while at the same time raising the output intensity.

In Pind the neotechnic inputs are quite dominant. The farmers are attached to the PAU (Punjab Agricultural University) which works towards developing and advising farmers on new technology-inputs. The relationship between PAU and the farmers is however strained. However, the agricultural system is dominantly attached to the Co-operation society which has one of their offices based in the village.

Among other things, the Co-operative society provides the farmers with loans, chemical fertilizers, pesticides and farming equipment. Although regarded as very important in providing the farmers with chemicals and loans, a limitation to the Co-operation society's ability to help the farmers is evident. The office has, for example, only machinery meant for sowing, which means that the farmers are dependent on loans in order to buy their own equipment for harvesting. Alternatively, they can rent this from someone who has the right machinery. Renting machinery from a private person would cost approximately 5-600 Rs per killa which is considered to be a fair price.

Among the machinery observed in the village are: Tractors, combine harvesters and threshers (that separate the grain from the stalks and the husks). Reaping, threshing and winnowing are three separate operations that can now be done in a single operation by combine harvesters. However, the combine harvester leaves the waste straw on the field and farmers complain about this, claiming that this means extra work for them since they have to burn the residue during the rice and wheat harvest. This of course also means that the farmers are burning potential fodder.

In addition to the machines meant for harvest, farmers state that they also buy machines for sowing despite the fact that they have the opportunity to rent these machines from the Co-operation society. Complaints are also made regarding the machine for sowing, called "the rota wheater", because it sows the seeds in curved lines as compared to the previous machine

that sowed in straight lines. The farmers state that it is therefore difficult to stay in control of the machine when sowing and, because of this they use more seeds than necessary.

Despite the many machines used in the fields the farmers are still dependent on farm labour. In fact, farmers state that they are actually having problems in getting enough workers. The lower castes that traditionally worked on the fields tend to move to the city for better jobs, leaving the farmers dependent on migration workers and those workers who have stayed behind in the village. The shortage of workers and the periodically very high demand for their services has naturally resulted in workers demanding higher wages.

It may be claimed that the need for more workers has also become necessary due to the high degree of chemicals used that have made the soil lose much of its fertility, thus making it necessary to use even more chemicals and manure to remedy the effects, and hence more work. The chemicals can also be claimed to be responsible (along with higher temperatures in mid-March) to be the cause of reported bug-population growth. The bugs are becoming resistant to chemicals after long exposure, or the pesticides are killing off competitive insects or animals and leaving bugs that destroy crops to roam freely and multiply.

Animal dung is regarded as a necessity for both cooking and food production in the fields and in the kitchen garden. Most farmers are self-reliant of dung, and this resource is said to reduce the need for more chemical input, thereby reducing further cost. However, this also means that the farmers labour costs increase, not only because the farmer needs to prepare the dung before spreading it out in the field, but also because the animals need fodder. The fodder is grown in the fields, and the farmers lie on their knees every day cutting the *Berseem* with sickles. Hence, the animals create more work for the farmers although reducing the cost and need for more chemical input.

Mechanized pumping systems, electricity, and generators for when there is no electricity are necessary components for high levels of output intensity. Inputs in the farming system mean higher expenses for the farmer, but the intent is that the profits from the surplus will make him able to pay the interests and loans. The inputs have provided farmers with more time on their hands in the past. However, it may now seem that costs are rising, not only in labour cost, but also the fact that the farmers need an increasing amount of input. Although the system in Pind is as stated above, a mix of paleotechnic input and neotechnic input, one might

be inclined to make the claim that due to the many problems caused by the chemicals, the paleotechnic end of Turner and Brusher's scale might gain more momentum in the future. However, due to the fact that the farmers do need more input to remedy the effects of the Green Revolution technology, the neotechnic input part of the scale might still be dominant although the output intensity might still continue to decline and the farmer therefore needs to spend more time in the fields.

The *production type* in Pind may be described as a mix of consumption (subsistence) and commodity (market) production. Wheat grown for commodity purpose in the fields represents a large degree of subsistence farming as it makes the farmers self sufficient in a greater part of their daily food consumption. Mustard is also grown in the fields and is used both for fodder and for human consumption in the household. Moong daal (a type of lentil) is also food cultivated by the farmer for self-consumption. Kitchen gardens are a normal part of the household structure. Here vegetables and food such as beans and peas of various kinds are grown and these represent a source of varied diet for the farmers and their families.

The farming strategy is very much oriented towards commodity production. However, it may seem that criteria for this to be a part of the strategy, the farmers must have a large degree of self sufficiency, by being able to consume their own food products. This is presumably because many farmers need to save money so that they can buy more farming input and give their children a good education in the hope that this might enable them to migrate sometime in the future.

Other factors that might maintain the farmers' strategy of being self-sufficient are the high food prices, the lack of local stores with a good enough product selection and the fact that many believe that food cultivated by the help of chemicals is unhealthy and in conflict with their religion. Based on the elaboration of Turner and Brusher (1987) three universal components *output intensity, technological type and production type*, I will categorise the village of Pind in the second category, namely the *mixed technic and production systems*

#### **5.4 Culture and the farming system**

I will here use my findings in accordance with Leaf (1987) described in chapter 4. Leaf stated that Punjabi villages in general contain six cultural information systems: 1. The village ecology 2. The management system 3. The economy 4. The kinship system 5. The system of

political ideas, and 6. The system of religious ideas. Since Leaf points out that the first three describe the farming system (The farming system will be introduced in accordance with Turner and Brush, 1987) I will here focus on the last three systems.

Before going deeper into the different aspects of kinship, political ideas and religion in Pind, it would be wise to look closely at the concept of “honour”. In the Hindu Kush Mountains in Northern Pakistan lies Tangir. Here fights and feuds are part of everyday life as honour is held high and is guarded with great passion. Aase (2002) states that in Tangir a feud is an occasion in which the families and men have the opportunity to

1. Prove their ability to defend themselves; *gheirat*-honour.
2. Accumulate merit to their reputation capital; *izzat*-honour

*Izzat* can be translated as merit or reputation. Aase (Ibid, p. 93) explains *izzat* like this: “*izzat* can be held in degrees. *Gheirat* is a dichotomous thing, while *izzat* is continuous. *Izzat* can be obtained through performance of valuable acts in various social fields. One of the most important fields for ascription of *izzat* is that of feuding. It can be accumulated by showing courage in combat, by negotiating a wise solution to a feud, and by acting generously towards a vanquished enemy, thus permitting him to keep his *gheirat*. *Izzat* accumulated this way can be seen as a kind of symbolic capital, since it can be transformed into other kinds of capital. Most directly, *izzat* can be converted into political influence”.....“Power is measured in terms of how many armed men a person can mobilize, usually brothers and sons, but power is also measured in terms of *izzat*, the symbolic capital a man has accumulated during his lifetime”.

Although it can be claimed that there are indications of *gheirat*-honour in Pind the data is far from par, therefore, because of the strong evidence of *izzat*-honour in Pind, and its relevance to agriculture, *izzat* will be the focus when presenting honour in relation to agriculture. Pind cannot be claimed to have such extreme conditions as Tangir, but it is apparent that there are some similarities. The question of *izzat* is indeed evident, although naturally set to the conditions that apply on the plain. For instance, *Izzat* is more an expression of both accumulated symbolic capital and actual capital/property, symbolic capital being an accumulation of a person’s merit through having a good reputation by for instance being well-known as a good host. *Izzat* also includes a person’s ability to provide a good life for his family through investments that will provide him with a higher rank in society. Investments may easily tip over to being termed conspicuous consumption, thus the farmer may be

tempted to get a fast display of his *izzat* by, for example, buying unnecessarily large farming machinery, or by building a grand house.

*Izzat* is heavily related to how many *killas* a man owns. It is through his fields and his ability as a farmer he has the potential to raise his and his family's rank in society. His success as a farmer will be reflected by him being able to invest in a good education and possible migration for his children, which in turn will provide a higher rank in society that again can offer opportunities among the "strong men" of the village.

The Punjabi governmental politics were, from the early days of the division of Punjab, founded on the Sikh religion (Leaf. 1987). Despite this, the old Hindu ways of social interaction are still very prevalent. The Sikh scripture, "The Guru Granth Sahib", declares that we are all equal and that there is no caste. Although the scripture is held high in theory, it is not always followed in practice. The caste system is very dominant in the village society and, although different castes share the same religion and might pray together in the *gurdwara*, social interaction is out of the question, and intermarriage would disgrace the higher caste family. Hence, there are social groups in society that all have rights and obligations connected to their particular group of caste, clan, religious community and kinship. The age-old system based on honour and rank is quite prevalent and all these issues play an important role in village society and how the farming system itself is structured.

#### **5.4.1 The kinship system**

Leaf (1987) describes *kinship* as the only reliable form for securing an individual's safety because of the lack of an effective governmental system of security in the village. Because of this, family is important to consider when making socio-economic decisions. As such Leaf defines kinship as family. However, we should be aware that this is possibly a too narrow definition. Kinship can also be understood as a group of caste or people sharing the same religious belief or people being part of the same clan. It is also worth mentioning that villagers often refer to the other inhabitants (of the same caste) in the village as brothers and sisters. This kind of symbolic kinship is also expressed by Baxter, et al (1998) when describing kinship as one of the most important structures within religious groups in India, and numerous blood-related and supposed uncles, aunts, siblings, grandparents and cousins can be included in this structure. Within this system each person is granted a status within the kinship hierarchy and will receive respect accordingly.

However, not unnaturally, in the village of Pind blood relatives seem to have highest priority, and decisions farmers make seem to be strongly guided by this, especially regarding the safety and social position of the family.

According to the farmers in Pind, a man's social rank or merit, hence, a man's *izzat*, is determined by how many killas he owns, regardless if they are cultivated or not. This implies that there might be realistic concerns for the future of farming in Punjab other than those of climate change. The fact that the farming areas are in the hands of a few castes, and in Pind only in the hands of the Jaats, who, although willing to lease out land to other farmers, will never sell their land since this would mean losing their *izzat*, does not bode well for the future. In addition, the majority of children growing up in the village are boys who many still consider to be the natural inheritors of the farmland, and this may also become an issue in future agriculture. Further concerns might also be proven valid when also realising that many young Jaats dream of migrating abroad or to the city, and try to achieve this by getting an education that is not relevant to farming.

The combination of these circumstances can be a threat to a positive development for the farmers and their farms.

This somewhat gloomy future scenario might however be proved wrong. Should many young Jaats succeed in their plans to migrate, this might imply a future shift in farming, where one may experience larger farms due to leasing of additional farmland from the migrated village inhabitants' farms. Additionally one might see a change in the old established cultural thoughts about *izzat*, and the possibility that this might make it culturally acceptable to sell ancestors' land without losing honour. This, in turn, might open for the possibility that landless castes can get the opportunity to own farm-land, or at least sharecrop the fields.

As briefly mentioned above, boys are still considered to be the natural inheritors of the farmland in spite the fact that according to the Indian law, daughters have equal rights to inherit as sons. A young woman told me:

*I have the same right to inherit as my brother, but I don't want to. I think that my inheritance should go to my brother.*

( Ramdeep (27), master student and farmer's daughter)

This attitude seems to have a great consensus in the village, and might be due to a daughters feeling of duty and obligation to her family, and to ensure that the family's land, property and rights remain in the family, and not be taken over by her new family when she marries.

However, there seems to be a tendency towards the sons choosing another way of making a living, and some farmers do not therefore know what will happen to the farm in the future. Some are therefore open to the possibility of letting their servant sharecrop the farm instead. One should note that most farmers do not even seem to consider the possibility of a daughter taking over the farm.

My survey shows that there are far more boys than girls who grow up in the village. In fact among 50 farmers, 40 girls and 75 boys constitute the last part of the family tree (in order to try to assure validity for this figure, married offspring who have not yet started their family have not been included in the calculation). There can be several reasons for this boy/girl ratio, for example that girls are perhaps more vulnerable to sickness. But also, although prohibited among Sikhs, sex-selective abortion.

Eva Bratholm (2011), counsellor at the Norwegian embassy in New Delhi, writes an article on the Norwegian government's website about the missing girls in India. She refers to the village Barhana in Haryana which last year had 203 births of which 148 boys and 55 girls. The situation in this particular village reflects the situation in India in general.

The reasons for the preference for boys are, as Bratholm states, that inheritance, rights and property will be passed over to the man. A man will pass on the family name, he will take care of the parents when they get old, and additionally, a male will be granted a considerable dowry when getting married. A daughter on the other hand will be married into another family, hence the old Indian saying of "watering the flowers in the neighbours garden".

The difference in the boy/girl ratio in Pind implies just this, but it might also reflect that there is a need for male help in the fields because of worker- scarcity. However, the main reason for the high difference in the boy/girl ratio must undeniably be as Bratholm claims.

The fact that arranged marriages are the norm, and that the girl's family must pay a dowry to the groom's family, has many serious consequences. The difficulty regarding dowry became quite evident when helping a mother who was looking for a potential husband for her daughter in the newspapers' matrimonial pages. When showing her a potential candidate for

her daughter she shook her head and stated that the family could not afford the man I had found for her. This was an Australian citizen with Indian roots who had the right caste (Jaat) and was the proud owner of a great many acres of land. The fact that he also pointed out his great wealth convinced me that he might be good enough to be taken into consideration for her well-educated daughter. However, the fact that this man and his family would certainly expect a huge amount of money as dowry due to his high degree of merit (izzat) as an Australian citizen with wealth and land, was a clear indication that the daughter would not be accepted by his family as a good candidate for marriage. Quite simply because the man's family would not get as good a dowry as they felt they deserved.

Marriage is overall a complicated affair in the community since one must not only find a suitable companion honour-wise but also find a candidate that is of the same caste, not of the same clan and not from the same village since villagers are regarded as brothers and sisters. All the rules for finding a suitable candidate creates a milieu of families who want to raise their rank (izzat) by, for instance, protecting their daughters' reputation by ensuring that they are never alone with a boy. The household is secured by high walls and strong gates, families even structure the sleeping arrangements in the household so that the females are always protected by the strongest man should anyone attempt to get into the house. In this way the family ensures that there will be no suspicion of lack of honour that would necessitate an even higher dowry.

The protection of women is important in Punjab society. Newspapers often have articles about car-chases between policemen and young lovers. By this I can conclude that families do not stand alone in their attempts to guard their interests, and that the police are also eager to help, although perhaps mainly because of the government's attempts to reduce the number of unwanted pregnancies. Police help is more likely to be received in the urban areas, therefore family is indeed important when trying to protect the family's interests.

Although households are guarded by high walls and strong gates there is little protection from gossip and ridicule, as stated in chapter 3. Thus, strict rules for social conduct are prevalent (can also be viewed in chapter 3).

Despite the problems facing a family with daughters, they are nonetheless loved.

Although this is expensive, the families try to get their daughters and sons through a good education. The English language is a pre-condition for studying at higher levels, but the



village school does not teach it. Those who can afford it therefore send their children to a private school closer to town that does teach English. In this way they invest in the future by giving their children the opportunity to continue their studies at a university in India or, if granted a scholarship, abroad. Higher education increases one's merit (*izzat*), but can also cause envy among fellow villagers. If the education has been completed abroad the envy is even more prevalent (This issue is also mentioned in chapter 3).

The fact is that most villagers dream of migrating abroad, preferably to Canada. Many have relatives who live in Canada and the consensus of opinion is that a better life waits overseas in another country. By investing money in their children's education they hope for the possibility of moving abroad while at the same time raising their own *izzat* through their children's education, migration, or both. The great respect granted to a migrated villager may for instance be described by this farmer:

*"I have great respect for my grandmother, she lives in Canada."*

(Valinder, 30, farmer, agronomist and professor's assistant)

When realizing that the woman in question was one of the first female *Sarphances* (leader of the *Panchayat*; village council) in India and is also referred to as a medical doctor by the villagers, the farmer's statement and sign of respect seems to get a deeper meaning. He could have pointed out all of the above attributes mentioned, including the fact that she lives abroad, but he did not. Instead it may seem that her foreign citizenship stands out from other achievements and thus also gives her a higher rank because of her *izzat* capital. It can therefore be claimed that also women can in some instances be capable of accumulating *izzat* capital or work as tools that will enhance the family's *izzat* potential, (another example that validates this claim will be provided later in this section).

Another example that validate the claim of migration standing out from other achievements is the young Jaat man of the Gill clan who enjoyed a good reputation in the village. In his childhood he had been granted a good education at private schools where he was taught English. He was eventually granted a scholarship which took him to the USA for higher education. But after completing his education, he came back to the village!

It did not matter that the man now had a good job at a university, the villagers did not understand why he had come back since he would have been able to provide his family with all they could ever want if he had remained abroad.

It should now be quite clear that to achieve a higher rank in society, farmers need to be able to make good profits from their farming, and the consensus of opinion in the village is that one best achieves this through high-yielding seeds and other Green Revolution products.

However, the government's fixed prices dampen the farmers' enthusiasm for this strategy in spite of the fact that this system gives the farmers a sense of security because the government ensures an income even if the crop fails. The reason for the negative attitude towards the fixed price system is that the highly mono-cultural usage of rice and wheat is not good for the soil.

Honour comes in several shapes and a farmer's conspicuous consumption, is related to how many killas he owns. The fact is that the farmers take great pride in being good farmers, the evidence of which is being able to show a solid profit from their production, thus enabling



Picture 5.2 "Symbol of prosperity"  
Agricultural machinery advertisement.

them to raise their izzat through new investments, sometimes made solely with this goal in mind. One farmer stated:

*"The farmers buy much larger tractors than needed, use more input than needed and hire more workers than needed. They think that they are "the man" when spending money on all these unnecessary things".*

(Valinder (30), farmer, agronomist and professor's assistant)

This statement can be claimed to be true, but farmers in general are not able to store such items, and simply cannot afford to buy other than what is necessary since

they seem to choose to put focus on their children's education in order to raise their izzat.

However, this does not mean that farmers will not save up money or take up loans in order to be able to display their ability to have conspicuous consumption. Private manufacturers of agricultural machinery do seem to be aware of this presumed need to be able to display one's prosperity and success, as one can see in picture 5.2.

Important to note however, is that people in general do seem to have the need for conspicuous consumption. It is a universal “thing”, but it is expressed differently within certain groupings in society.

The expressed feeling of the informant seems to reflect a common opinion among scholars in the region that claims that farmers are only interested in impressing other farmers. But, the farmer does raise a point since such a display of wealth (conspicuous consumption) would most likely serve as an indicator of a man’s success as a farmer.

However, during fieldwork in Pakistan-Punjab, Aase (1991) experienced that farmers did indeed tend towards conspicuous consumption, and even farmers with small plots of land would buy enormous agricultural machinery that they would have problems to manage because they were too big for their plots. In any case, in Pind farmers claim, at least regarding the use of chemicals, that the perceived over-use can be explained since farmers do admit to modifying Green Revolution technology by using more chemicals and pesticides than recommended. This is done in order to make the technology more relevant to their environment and is seen as a necessity:

*“We modify the technology and input we get from the PAU. Why shouldn’t we? Their soil is far better than ours. Our environment is different from theirs”.*

(Baldeep (30), farmer)

However, even though the farmers are generally very traditional in their way of thinking not least regarding issues such as social rank, they are generally quite careful with their money and who they choose to do business with. They are sceptical to private companies that sell farming inputs and prefer to deal with the governmental Co-operative society instead, perhaps more so since the office of the area is situated in Pind and the head of the society is a local farmer. However, it may seem that farmers are willing to deal with private companies if security and trust is ensured by the bond of kinship. As a farmer stated:

*“We used to change seeds every 2-3 years, but now I have a brother-in-law who has his own company so now we can change seeds every year”.*

(Mandeep (26), IT graduate and farmer’s son)

Here we can read the enthusiasm of a young farmer who sees the opportunity to grasp the possibility to raise his family’s *izzat* through his new relative. With the help of his brother-in-

law he is perhaps granted a head-start over the other farmers in the village since he now has the potential of new agricultural technology within reach, presumably at a good price. As stated earlier, females can function as a tool for raising family *izzat*. In this case, a successful marriage had resulted in the family getting access to technology that could help them in their attempt to achieve a higher rank in society, thus the “watering of the neighbour’s flowers” did in this case prove to be valuable. By marrying off their daughter they gained a son.

Maintaining family honour and rank shows itself in various forms in society. As referred to in chapter 4, in the Economist 2nd February 1991 “Anonymous”, (1991), claims that more of the lower caste are moving to the city, and by doing so have left the Jaats short of workers and claiming that the Harijans do not show them proper subservience. This is said to have sparked the Sikh insurgency in Punjab in 1990 that resulted in thousands being killed by Sikh Jaats - mainly Harijans.

According to the Hindu system of caste, the Harijans are beneath the Jaats. Within this system the castes have rights and obligations to each other, and this structures the social system in a community. When the Harijans did not do their duty by acting as workers for the Jaats, they showed a lack of respect and so the Jaats saw no other solution than to retaliate.

“Anonymous”, (1991), states that the former chief of police in Punjab, K.P.S. Gill, brings up an age-old Jaat myth when he characterises these Jaats as living by this principle

(Anonymous. Ibid. p. 37): “Love of a good gun, a good fight and abhorrence of surrender”.

One might claim that abhorrence of surrender and respect for a good fight is generally highly valued in Punjab. For example a state holiday has been implemented in honour of Bhagat Singh, a Jaat martyr who fought for India’s freedom from the British by advocating violence. Mahatma Gandhi on the other hand is generally sneered at, and blamed for selling out to the British.

One should be careful to generalise, but it might be interesting to note that the validity of the chief of police’s comment can be claimed to be an indication of the general milieu in the village Pind, where conflicts between different social groups and the abhorrence of surrender was confirmed by the farmers. The use of fights and weapons was also confirmed as stated in chapter 3, and may serve as an example of the tension between various groups in the community.

An example of conflicts and the abhorrence of surrender is the family who had been split up due to accusations of dishonour and lack of respect because of an oral instead of a formal wedding invitation. The quarrel had been going on for years, and neither side seemed eager to back down. The tension between the two groups was quite significant and forced the researcher to stop visiting both since it became evident that such visits worsened the conflict.

A more interesting example might be that there is a consensus among the farmers that states that the previous formal channel water management organization was dissolved because of several conflicts between the farmers. Curiously however, the water management was reinstated at a later stage, and although not all farmers agree, stating that there are still conflicts, it is claimed to work well.

These may serve as examples of the importance of maintaining one's family's interests and security by kinship in order to maintain ones rights in society, and thus, by doing so, enabling the farmer to raise the family's izzat through his ability as a farmer.

#### **5.4.2 The system of religious ideas**

Religion has an important place in everyday life and society in general, and a daily visit to the Gurdwara is common. The Sikhs pray several times a day and are very dedicated to their religious beliefs. The Sikh religion believes in keeping the body and mind clean. Believers are therefore expected to refrain from drinking alcohol, smoking tobacco and taking drugs. Many also believe that one should not eat certain foods in order to keep the body and mind pure. This seems to confirm that the Punjabi food culture is in fact in accordance with Leaf's (1987) information *system of religious ideas*.

Although the Sikh religion accepts both vegetarians and non-vegetarians, the vegetarian diet is quite common among the "true" believers, but some Sikhs are devoted to veganism. Vegans are dedicated to a very strict diet that not only forbids them to eat meat, but also forbids them to eat or drink anything from an animal. Certain vegetables, like onions and cabbage, or fruits, are also forbidden to eat because of the fear of harming a living creature. Even the non-vegetarians' diet is quite restricted to chicken meat. This may be due to some kind of mutual religious understanding between Sikhs and Hindus, who consider the cow to be a holy creature.

Another reason could be prices and shortage of any meat other than chicken in Punjab or for that matter, in India as a whole. Naturally this affects the structure of the Punjabi farming system (important to note here is the fact that the vegetarian diet, that is often very strict, is quite common throughout India). The demand for crops such as wheat is, for example, therefore greater than the demand for meat, and the farmers therefore naturally structure their farming system on this.

One can in fact claim that the dedication and belief in religion seems to influence farmers' attitude towards organic farming. The belief is that all the chemicals used in agriculture are bad for the health and pollute the mind and body. Naturally it can be argued that this is the case whether or not you are religious but there seems to be a consensus of opinion that religious purity of body and mind cannot be achieved if polluted by agricultural chemicals. Agricultural chemicals therefore have the same status within the religious belief as alcohol, tobacco and drugs.

Well worth noting is that farmers' wives and daughters blame agricultural chemicals for deaths among the male farmers claiming them to be connected to polluted water and the chemicals used in agriculture.

The belief that the agricultural chemicals are bad can be illustrated by these quotes: *“We cultivate half our land with rice in the kharif season and wheat in rabi season, the other half we cultivate with vegetables. We sustain ourselves with vegetables because we don't want to eat chemically produced food”*.

(Harpreet (23), teacher and farmer's daughter)

*“We have a kitchen garden where we cultivate food organically, we need to think about the environment and our health”*.

(Valinder (30), farmer, agronomist and professors assistant)

It is however interesting that belief in organic farming is only followed up in practice when providing their own families with “pure” food with the help of their kitchen gardens and by dividing their field into “clean” vegetable areas. However, since farmers' families consume many kilos of wheat during a year this also raises some questions that should be investigated. For instance, do farmers also divide their wheat fields into organically produced wheat and chemically produced wheat?

All this seems very well, but if farmers and their families are so devoted to their religious belief, and if the importance of ensuring a pure body and mind also includes avoiding chemically produced food, then why do farmers produce chemically produced food at all?

The answer possibly lies in the system of kinship as described in 5.4.1, and the fact that the government of India and Punjab has directed agriculture into Green Revolution agriculture aided by subsidies, the fixed price system, the Co-operation society etc, and by the fact that there are not enough cattle to fertilize all the killas organically.

*“My deceased father had plans to produce only organically, my brother is now considering doing so, but we have too few cows to manage all our killas organically”.*

(Harpreet (23) teacher and farmer’s daughter)

And so, due to practicality, it may seem that some farmers stick to the Green Revolution technology. However, how one actually manages this practicality seems to be regarded as having certain religious implications for the farmer.

*“...have you seen the small lake out in the fields? There used to be many fish in it, but then a family used all the water in the lake to water their fields. We could hear the cries from the fish as they died in a horrible way. Now the family has been struck down and have become mentally ill because they’ve got bad karma”.*

(Indirjeet (27) master student and farmer’s daughter)

Hindus and Sikhs share a belief in Karma, the belief that one’s actions are responsible for one’s suffering. The family’s actions have given them bad karma because their actions are regarded as bad. However, the statement may bear witness not only to the religious aspect that affects a farming system, but also to the possibility of a family desperate for water, perhaps suffering from a dried out well and not being able to pay for the immediate technological solutions needed, being forced to deal with the situation in any way possible, regardless of the consequences.

The fact of the matter is that the Green Revolution technology needs more water than the traditional farming methods, and the village, as most of Punjab, is dependent on groundwater. Since the water level is sinking it is necessary to dig even deeper to reach it. The consequences to farming due to less rain and several droughts must also be considered. For this family, water shortage led to desperate measures that branded it with bad karma.

### 5.4.3 Political ideas

The whole state government is based on the Sikh belief, and there has been much turmoil between the Congress party and the religious SAD party. This was also the case in the village of Pind, hence members of the SAD party were not allowed to socialise with members of the Congress party. This can be said to be due to operation “Blue Star” of 1984 and the events that followed, leading to killings of thousands of Sikhs and the assassination of Indira Gandhi.

However, other political difficulties were evident after my arrival in “Pind”. The elected *Sarpanch* had been removed from office because of suspicion of election fraud and was now waiting to stand trial. No one in the village was eager to talk about this, and would only mumble some response to satisfy my curiosity. It may seem that the incident had brought shame not only on the person in question, but also to the village as a whole. However, one man stated that this was only one of many examples of political corruption and lies that haunted the village.

The *Pind Panchayat* (*Pind* meaning village) was now without a leader, something that did not seem to matter much. Although the Panchayat institutions have existed for a long time, “it wasn’t until 1992 that the Panchayat institutions were constitutionally recognized and were given authority over the planning and implementing of ‘schemes for economic development and social justice’, including soil conservation, irrigation, water management, watershed development, social forestry, farm forestry, drinking water, fuel, fodder and waterways”, (Constitution of India, 1996 cited by Riley 2002, p.45). The Panchayat is regardless of this not seen as having any influence on the farmers and their farming system, and although the farmers are organized through the highly respected Co-operation society and some informal organizations, farmers ultimately work individually.

However, well worth noting relevant to the Panchayat institution is, as stated by Tompsett (2010, p. 16), that “This modern PRI system based on principles of universal adult franchise is not to be confused with traditional forms which may still be operating, for example the *Jati* (caste) *panchayat*. This consists of caste elders and may perform judicial functions, settle cases of violations of caste norms and rules, and dispense punishments”.

Statements from farmers in “Pind” seem to confirm that this age-old system still prevails in the village, claiming that the Panchayat could help them with applications for the maintenance of the irrigation system and the digging of new waterways, but the Panchayat with its



members could also act as a body to solve village disputes, hence the need to contact the police was reduced.

In terms of power relations in the village system it seems clear that some “strong men” and the party leaders have some affect on the village. This might be claimed to be embodied in the annual sports tournament that is arranged in the village by party members. Here, important Punjabi politicians are invited as special guests and the local SAD party shows off the splendour of the village while also taking the opportunity to create a common arena for the local and regional decision makers.

Worth noting here is that some villagers are expected to provide the prizes that are handed out to winners of the tournament. These prizes are often a considerable sum of Indian Rupees, thus providing the farmer(s) who donates with a possibility to show off his conspicuous consumption while at the same time respecting the Sikh belief in self-sacrifice for the common good. Needless to say, the tournament takes a considerable toll on the donating farmers’ income.

In order to see how political ideas affect the village’s farming system in other ways, we have to look towards the governance outside the village. The fact of the matter is that the government decision to work with fixed prices for wheat, rice and corn certainly has an effect on farmers’ chosen farming strategy. Further, the government’s decision to implement the Co-operative society offices into the rural areas in order to make the Green Revolution inputs, machines and loans easily accessible to the farmers, also has an impact on the farming strategy.

Although these strategies can be claimed to have positive effects such as encouraging farmers to use the Co-operative society, which has low interest rates and fair prices, instead of private companies with high interest rates that put farmers in heavy debt and therefore makes them dependent on them. Naturally, farmers are faithful to the Co-operative society and state that it is a positive contributor to their farming.

However, although the fixed pricing system gives farmers a sense of security since it gives them a predictable income (be it high or low), many farmers are dissatisfied with the system because it limits the diversity of crops they can produce. Naturally, this affects the farmers’ choice of which crops to cultivate. Another source of discontent is the fact that farmers are dependent on electricity to pump up ground water to irrigate their fields, whereas there is a serious shortage of electricity to do so.

Some farmers believe that their dependence on the Co-operation society in some ways takes away their independence. Further, the PAU, which, among other things, is meant to help to improve farming, advise farmers and otherwise be at their assistance, is generally avoided by the village farmers because they feel that the scholars are making fun of them and not taking them seriously. In addition, they don't see what use they can make of the technology at the university. And although the farmers fair (Kisan Mela) is arranged annually, as a means to get in contact with farmers and to present new technology and advice, the farmer's claim that the technology that is presented is in general too expensive even with subsidies, and is otherwise largely irrelevant for small-scale farmers.

However, farmers have found ways to cope with the perceived problems regarding technology relevance by modifying the technology and inputs in order to be better suited to their own environment. The modification is especially prevalent to pesticides and chemicals and the recommended amount and mixture to cope with plant sickness, nutrition depletion and vermin.

In general, farmers express some degree of distrust to the governmental agricultural strategy, and also feel that there is a lack of governmental devotion to implement new ideas into the farming system. A farmer shared this story:

*"..A couple of years ago the government urged us to buy a special Basmati seed. It was said to be less productive but would need less water. The market were one should sell this rice was about 100 kilometres away from here, but the government promised to come and pick up our produce. But this never happened. The prices also sank a lot. We had to arrange for the transportation to the market ourselves and we lost a lot of money because of this".*

(Manvir (28) Professor's assistant and farmer's son)

Despite the fact that the village has its own market (mandi) for rice and wheat, many farmers decided to try the seed that the government urged them to use. The decisive factors seem to have been the assurance that the seed would need less water and that the government would pick up the produce.

## 5.5 The Farming System

### 5.5.1 Agricultural calendar

The agricultural year begins with a visit to the Farmers Fair (the Kissan Mila) at the PAU in mid-March. Here farmers are presented with new technology, machines, seeds and general advice on farming.

Also in mid March there is an exponential rise in temperatures that causes a higher risk of plant sickness, and especially yellow rust, blackening of the leaves and rolling of the leaves.

Also pests, like the dreaded bug (tella), become a greater danger to the crop.

Because of this, farmers are extra cautious and will make sure that they have got the chemicals needed to avoid and /or reduce any product loss due to sickness.

From mid-April the farmers begin to harvest their wheat. Depending on how many killas the farmer owns he then needs to hire workers and machines for the harvest. The machines are hired privately from or through family or friends. The harvesting of mustard for fodder and oil coincides with the wheat harvest. It is now important for the farmers to sell their products as quickly as possible because of the lack of storage space, so a market (Mandi) in April-May is arranged where the farmers sell their wheat for fixed prices.

In April/ May the clover-like plant called berseem, which is used for fodder, has had its last cutting. Now there is a critical period for animal fodder. The fodder problem is solved with the help of mustard, but mostly with the help of wheat residue.

Before the rice law of 2008 farmers would start to sow rice shortly after the wheat harvest. However, the law now prohibits any rice sowing before mid-June in order to save water by delaying the rice cultivation closer to the monsoon season. Because of this, farmers sow the Moong Daal lentil, instead. The Moong Daal cultivation is good for the soil and the farmers are able to make use of the “dead-time” between the wheat harvest and the rice sowing. The final product will either be sold and/or used for home consumption, depending on how many killas the farmer owns.

Some of the profit from the wheat can now be used to buy inputs for kharif season. Those who need a loan in order to manage the rice season will now soon contact the Co-operative Society, while other farmers will now pay back their loan to the Co-operative Society, get hold of workers, machines, seeds, pesticides, chemical fertilizers, and collect several tons of

dung for paddy. The machines are hired from the Co-operative Society while the seed(s), pesticides and chemical fertilizers are either bought from the PAU or the Co-operative Society, but preferably from the Co-operative Society.

In mid-June the farmer then starts to sow the rice for nursery. The monsoon season hits shortly after this and after about 30 days the farmer will start the transplanting. During the next months the farmer will nurture the rice and carefully control it for pests and sicknesses. The rice is harvested in October when the farmer again needs to get hold of workers and machines, and will again pay some of his debt to the Co-operative Society. The machines are this time hired privately from or through friends or family. As with the wheat, due to the lack of storage space for the product, the fixed price market is arranged shortly after the rice has been harvested. Farmers can now again pay back some of their debt.

In October there is again a critical fodder period, the clover-like fodder plant berseem has been planted approximately in September and will give about 4-6 cuts before the season is over in May, the cutting being done by farmers themselves with sickles. Depending on environmental conditions the first cut can be taken about 50-60 days after sowing. So the critical fodder period is handled with the help of rice residue. Important to note is that when the berseem is ripe, both wheat and rice residue are still stored for the animals. Before the wheat sowing the farmers who are in need of a loan will contact the Co-operation Society.

In October/November there is again need for workers. Also machines, seeds, chemical fertilizers, pesticides and the collected dung are needed for the sowing of the wheat. Machines are again hired from the Co-operative Society while seeds, chemical fertilizers and pesticides are bought from the PAU or the Co-operative Society; The Co-operative Society being preferred.

Dung is used to prepare the soil, but chemical fertilizers are used afterwards when the wheat has germinated. In October/November mustard is also sown, but farmers generally sow mustard in small narrow lines that separate the fields. During the rabi season which lasts from October to May the wheat is nurtured and inspected by the farmer, the fields will be sprayed with pesticides and fertilized as they see fit. Dung is also used and one can see it being wheeled out to the fields and spread wherever it is needed. In mid-March there will again be a high increase in temperature and the cyclus of events repeats itself.

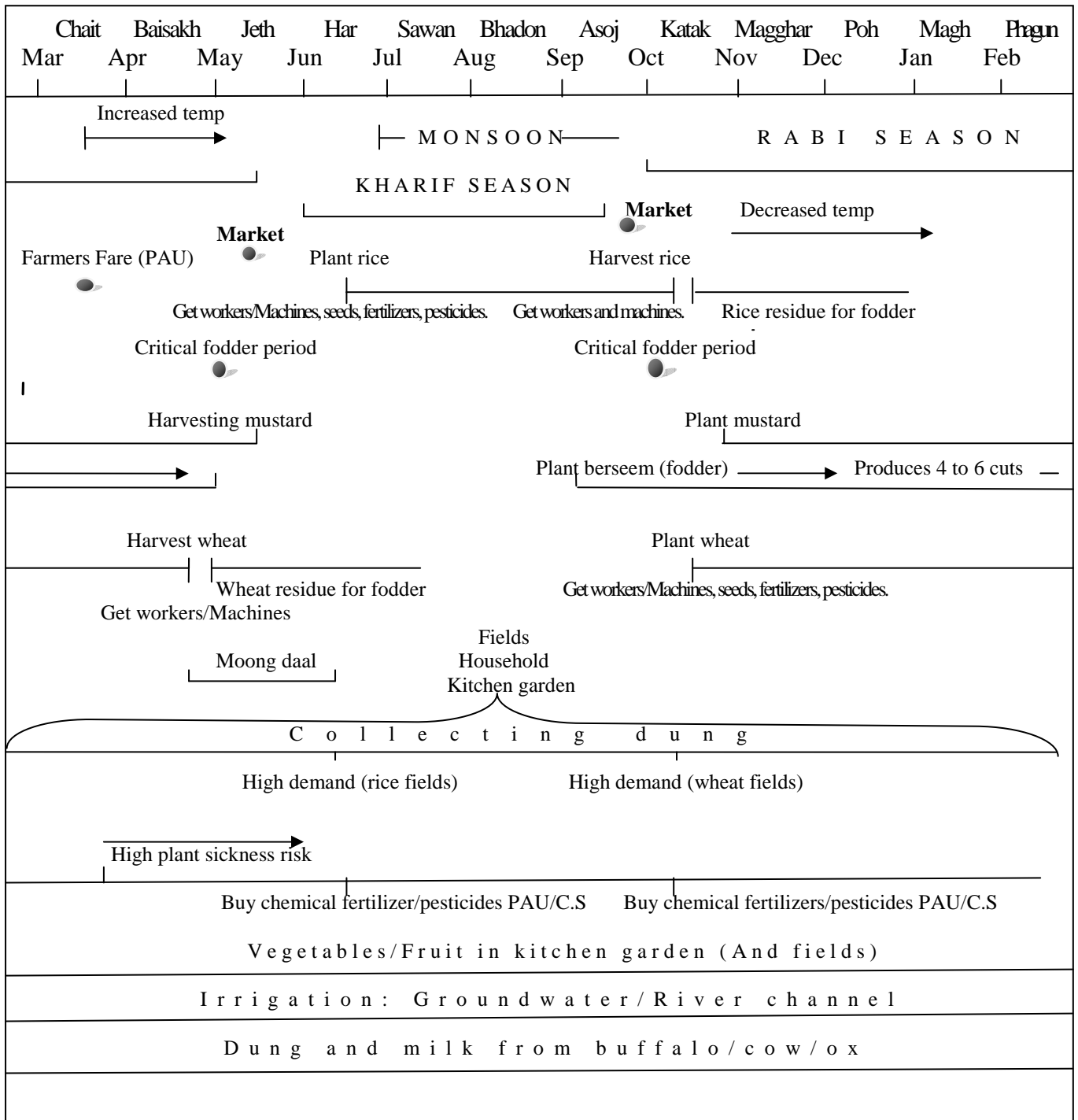
Farmers divide their fields into organic and chemical fields, using the organic fields for their own home-consumption. Vegetables are cultivated throughout the year on the organic part of the field. Farmers claim that this kind of farming is not suitable for everyone since vegetables need more nurturing than for instance rice or wheat, and is therefore especially suited as a joint family enterprise. This is because they then have more family members who can take care of the vegetables and they can then save expenses since they are therefore not dependent on hired help.

Dung is used all year round and is a highly-valued resource. Dung is not only collected for use in the fields, with demand peaking in mid-June for the cultivation of rice and in October for the cultivation of wheat, but is also collected for the household and the kitchen garden. The household uses dried dung-cakes for fuel and dung for fertilizing the kitchen garden respectively. The dung comes from the farmer's buffaloes, cows, horses and oxen. The buffaloes and the cows also provide a year-around production of milk that is used for home consumption. Farmers with several milk animals also have additional income from their milk production. Since paddy is the crop that requires most water it naturally puts a strain on the water resources, and even though the monsoon season helps to reduce the strain on the groundwater and the river channel system, it is to be noted that irrigation is needed throughout the year.

It should be noted that the farmers operate with different varieties of both wheat and rice and that these have different management requirements.

Farmers also cultivate some oilseed, and there is evidence of cultivation of maize. However, farmers don't seem to find it necessary to mention these crops when describing their farming system.

**Figure 5.1: Agricultural calendar for Pind**



### 5.5.2 Household

The household is defined as a group of people who share the same economy, but does not include servants. The typical household consist of one family with a mother a father and their offspring. However, it is not unusual that the father's parent or parents are also part of the household. Joint families sharing a house and fields are also common, but these do not share the same economy.

Part of a wife's job is to make dung-cakes (which, if sold can give an income of 2 Indian rupees per cake) and often also to prepare dung for the fields.



*Picture 5.3 Drying dung cakes for fuel*

The farmer's wife also maintains the household, and does all the cooking and cleaning. The typical farmer-household has a refrigerator, washing machine, TV, computer and a modern gas-stove. These items have made the housewife's life easier and have allowed her to have more time on her hands, and although wives rarely leave their house it is now not unusual for a

wife to take a job in order to contribute to the household economy. The wife is not regarded as a farmer but her management of the household does contribute to manage the farm by milking animals, manage the dung, keeping the household together and to a large degree administrating much of the subsistence production and consumption.

The kitchen garden is very important subsistence-wise and is common in the typical Jaat households. Here vegetables, spices, herbs, lentils and beans of various kinds are cultivated. Some households also have a few fruit trees. Although some farmers (and servants, depending on how large a kitchen garden one has) may also work in the kitchen garden, it seems to be safe to say that the kitchen garden is the wife's domain.

Organic farming is the mantra for the management of the food for subsistence. However, every so often the lady of the house will use the courtyard to dry wheat grain in the sun for

home-consumption. These grains come from the family's field and will end up as *roti*, a wheat and water based pancake optionally smeared with *ghee* (butter made from buffaloes milk), which is part of the daily food intake. Despite the fact that modern gas-stoves are common, one prefers to make some of the food on the traditional out-door stoves that are fuelled by dung-cakes since this gives the food a better flavour and the household saves the expenditure for gas by using the dung as fuel instead.



Picture 5.4 Drying wheat for home consumption

It is important to note that *roti* is consumed several times a day and that this means that quite a large part of a farmer's surplus of wheat ends up in the family's bellies. Another popular food is *daal saag*. Daal is made from lentils, while Saag is made of mustard. The mustard plant is a decorative part of the farmers' fields during the rabi season, and not only provides the farmers with saag meals but also mustard oil, which is also an important part of the Punjabi diet.

*Moong daal* is a lentil and is also a popular source of food. Curd, lassi and ghee are all popular milk products. Curd is especially regarded as being a delicacy which is served for special occasions. Curd and lassi are regarded as having special powers, stabilizing the stomach and keeping one healthy. These products are served with great solemnity, and are especially popular during the hot months, because they cool you down during intense hot days.

It is quite usual for a Jaat family to own a computer. This item is naturally an essential item when trying to ensure a good education for the children. It is also a cheaper way to keep in contact with family or friends abroad since the internet is preferable to the telephone for such contact.



The farmer and his wife usually start their day at about 3:30 in the morning. They will then say their prayers and go to the Gurudwara. Afterwards the farmer will go to his fields and cut berseem for fodder while the wife milks the animals. The farmers use a fodder cutter for chopping the fodder up before feeding the animals. The farmer is also responsible for bathing and cleaning the animals. The farmer takes dung out to the fields and spreads it there as fertiliser. He may also take an interest in the kitchen garden and how to manage it. The family will shut the gates and get ready for bed at about 7 pm. The farmers' contribution to the household work-wise can largely be narrowed down to this because their work-load is mainly situated in the fields.

### 5.5.3 Water

The people of Pind are dependent on groundwater and water from the channel.

There is an ongoing debate in the village regarding the quality of the channel water. Some



*Picture 5.5 The channel system*

claim it to be polluted by industrial waste, while others claim it to be better water than groundwater because it is water from the glaciers, and is therefore regarded as being cleaner and containing more minerals than the groundwater. The claim is that since there are no sizeable industries located close to the river that feeds the channel before

it flows past the village, the claimed pollution is nothing to worry about.

Still, sceptics are not convinced and keep away. One family father stated that one of the reasons why he had a buffalo was because of the suspicion that the milk producers in the village mixed out the milk product with water from the channel, thus making greater profits while being a threat to the health of his family.

Instead, he preferred to provide his family with milk from their own buffalo.



Picture 5.6 The river channel water is led to the fields...

Whatever many purposes the channel has, its main task is to irrigate the fields and it is constructed in such a way that water is led to the fields by several feeder channels.

Excess

water is guided back into the channels ready to be used by other farmers in the village. The excess water eventually ends

up in what the farmers only refer to as “bad water”, which is a slow-moving small channel covered by vegetation, and in which piles of litter tend to end up.

There are complaints regarding the maintenance of the channels’ irrigation system, since this is not followed up and results in vegetation blocking the water from running, thus slowing the water’s movement to its designated area. Hence some farmers see little use in the channel for irrigation and rely solely on the groundwater.

The farmers cannot use the channel water whenever they want to since a water-board structures time-schedules for the farmers who are interested in using the channel water. The water-board has elected a leader who has the mandate to portion the resource justly between the farmers, starting with the different up-stream villages before working its way down-stream before starting all over again in a system of rotation. The portioning of the resource is done all day and night, and the night-time watering is naturally unpopular.

Farmers also complain that some farmers do not respect the rules and try to exceed the watering-time they are allotted. This means that the next farmer in line has to wait until the other farmer finishes and thus feels that he has “stolen” time from his own time-share. This leads to quarrels

and fights, and, with the other reasons mentioned above, some farmers therefore try to avoid the use of this type of irrigation. The fact that electricity needed to pump up the groundwater is free of charge certainly also encourages farmers to choose this option to avoid the channel



Picture 5.7 ...from this section.

water. However, farmers who use the channel irrigation system seem happy with the system, stating that although sharing of the resource was indeed troublesome with many serious disputes involved, the system is in fact working well these days after having established the informal water-board.

Although many of the users of the channel irrigation system seem more or less content, the channel water cannot replace the farmers' dependence on groundwater. The channel water does however reduce the farmers' dependence on this, and this in turn helps to reduce the pressure on the groundwater resource.

The groundwater is the main water-source used in the fields, and preferred by many farmers over channel water because they then escape the many perceived problems with the channel water and its management.

It is here important to point out that the management of groundwater is different from the management of the channel water. Generally, each farmer manages his own pump-system and resource (Important to note however is that decisions about sharecropped fields are naturally done by the landowner). Although the resource is in essence a shared one that is diminishing quickly, there is no debate on how to manage and share the water in a sustainable way.

Instead, focus is on buying new technology so that the extraction may continue. Because of this, feelings are mixed among the farmers regarding the groundwater and if they are faced with water problems or not, stating that the groundwater is deteriorating quickly due to heavy use because of input that needs much water and the lack of rain.

However, at the same time, the farmers point out that there is no problem with the depleted resource due to technology that makes it possible to extract water 200 meters below the ground. When the water level is reaching its critical low the consensus solution is to dig even deeper into the ground, but this, of course, entails huge expenses.

The fashionable technology among the farmers is the submersible pumps. This pumping system is dug into the ground and allows farmers more freedom because they no longer have to make as many trips out to the fields to check if thieves have been stealing parts, as was the case with the former system which was above ground level.

Still, the groundwater level will continue to drop unless measures are taken. The government has implemented a new law called; "The Punjab Preservation of Sub Soil Water Act, 2009", or the more popular name "The rice law of 2008". This law prohibits paddy nurseries before 10th of May and transplanting paddy before approximately mid-June. The goal is

to reverse the overall ongoing sinking water level which haunts Punjab and its farmers, and also, by

doing so, trying to save electricity since a higher water level will reduce the need for electricity to pump up water for irrigation.

Important to note is that the law was implemented in 2008 and has therefore only been operative for a few seasons. Therefore, the law's effects may not have reached its full potential. Still farmers in Pind state that the law has had some positive effect, although they feel that it has not solved the water depletion problem. Farmers also state that this law has caused problems regarding workers and labour shortage since all the farmers need workers at the same time, which again means that the workers demand higher wages.

Although one of the aims of the law is to save electricity, it seems not to have had any specific effect in Pind, where farmers have not noticed any change in the electricity supply. During the drought in 2009 the strategy among most of the farmers to cope with the



*Picture 5.8 Dried out wells*

lack of electricity (described as almost none-existent during the drought because of little water in the Bacra dam) as well as the water shortage, was to use a generator. However, worth noting here is that some farmers stated that they did not have any water problem during the drought because they own only a few killas. Some years ago two farmers tried to tackle the electricity problem for irrigation by installing a pumping system based on solar energy. The attempt is described as a complete failure and has not made farmers overly enthusiastic with regard to trying this option.

All the fields in Pind are irrigated and the schedule of watering the crops depends on the season and amount of rainfall. Also, different crops have varying needs. The irrigation schedule also depends on the combination of crop needs, the number of fields and whether or not farmers share the same channel lock or the same pump-system and groundwater channel.

Water management in Pind is complex, and despite the ongoing reduction in the ground water table there do not seem to be any great attempts, other than the rice law of 2008, to change the situation other than as short-term solutions.

The farmers of Punjab are dependent on electricity because of the need to pump up ground water for agricultural as well as domestic purposes. Electricity is a resource that is free in Punjabi agriculture, and since electricity and the groundwater are used freely without any restrictions other than access to electricity which is handed out for so and so many hours before the farmer has to use his generator to continue the watering, it is worth noting that electricity is a limited resource in Punjab, even in the agricultural communities that have laid



Picture 5.9 Submercebal system for groundwater extraction

the foundation for the state being named “the breadbasket of India”.

It is not unusual to hear generators purring heavily because of the sudden stop in the electricity supply or to find oneself in total darkness for hours because there is no electricity.

Thinking that the electricity problem perhaps was just a winter phenomenon and that the

electricity supply would be filled

up during the monsoon, I asked a farmer to confirm this:

*“Wrong. In the winter time it is bad, but in the summer time it is even worse. One summer it was not unusual for the electricity to disappear for about 12 hours a day”.*

(Baldeep (32), farmer)

Another frustrated farmer expressed:

*“I prefer using the river channel. The government cannot provide us with enough electricity. We were promised 8 hours electricity but we only get 2-3 hours”.*

(Mandeep (26), IT graduate and farmers son).

The usual strategy for farmers to cope with the electricity shortage is to use a generator. This means a reduction in farmers' profits due to the extra costs for petrol or diesel. Another cost relates to the necessity of buying new pump systems that can reach down to the ever declining water levels.

It seems difficult to stop the dependence on the high yielding Green Revolution seeds, chemical fertilizers and pesticides, because of the fixed safe prices offered by the government. When we take into account that these inputs are the main cause of the declining water level, we also realize that the soil will need an increasing amount of water and of course electricity. Needless to say, the declining water level, the fixed prices and the lack of electricity itself, must have an effect on the farming system strategy.

A farmer describes the difficulty of balancing these elements when asked about his farming strategy with regard to flexibility:

*"... climate and changes related to climate makes farmers flexible, we have to be flexible. But at the same time farmers cannot be flexible because we have to make money and that means that we have to use water".*

(Akalbir (56), farmer and director of the Co-operation society in Pind)

Here the farmer describes the necessity of being flexible to changing weather conditions and changes related to it (for instance, increased bug population when temperature increases). The farmer does however also express that he is dependent on making money and that this means that he needs to use water, stating that this makes him inflexible. This of course also applies to the need for electricity.

Table 1 may be used as an example of the water situation in Punjab. Here 50 farmers were asked to rank the different elements in accordance to their belief in what they needed in order to produce more crops, 1 being the most needed, 7 being the least needed. In retrospect, electricity should also have been implemented as an element in the ranking.

It is quite clear that water and manure are most significant for the farmers. The lack of enough labourers has also been stated to restrict more crop production. More pesticides are regarded to be quite important since plant sickness and pests have become an increasing problem. Better seeds and changing seeds more often has been mentioned as being important in order to maintain a healthy soil, and hindering the need for more chemicals.

N=50 Rank	More water	More Labour	More Manure	More Chem. fertilizer	More Pesticides	Better seeds	Better extension service
1	26	7	6	1	1	8	1
2	12	6	25	3	-	2	2
3	3	12	7	6	17	5	-
4	3	5	6	5	17	11	3
5	5	5	1	14	8	7	10
6	-	8	3	15	6	8	10
7	1	7	2	6	1	9	24

**Table 5.1: Variables needed to increase production**

Interestingly more chemicals and a better extension service are not regarded to be that important in order for the farmer to be able to produce more crops. This could of course mean that they are satisfied with these, but findings indicate that they don't see the relevance of the research made at PAU for their farming and that the relationship between farmers and governmental services and the PAU needs bettering.

There is a consensus among the farmers that in addition to the lack of electricity and the decreasing water table that precipitation is indeed becoming a problem due to the lack of rain to water the crop and the farmers are now finding it difficult to predict when the rain will come. The reduction of rain has made farmers more dependent on groundwater.

*“We used to be able to predict when the rain would come, but not anymore”.*

(Harbir (52), farmer and former worker for chemical fertilizer company)

*“When I was a little boy there used to be 3-4 feet water in the fields in the rainy season, but now there is a shortage of water”*

(Gatnam (60) farmer and panchayat member).

*“When I was a little boy there was more than enough rain and we weren't that dependent on groundwater, the groundwater was near the surface making it easy to extract, but now the groundwater is far below the surface”.*

(Akalbir (56), farmer and director of the Co-operation society in “Pind”)

Also statements about the groundwater level decreasing significantly during the last two years may be presented as examples.

*“I use river irrigation as well as groundwater. The last 4 years our groundwater-level has decreased dramatically, in 2 years the water has decreased 10-15 feet”.*

(Mandeep (26) IT graduate and farmer’s son).

Here we can see that even though the farmer uses channel water as well as groundwater for irrigation he still experiences a groundwater level decrease.

*“10-15 years back the groundwater surface was 10-15 feet down, now it is 40-60 feet down and so the price for pumping up the water has increased”.*

(Gatnam (60) farmer and panchayat member).

Also statements referring to the water problem to be related to the change in crops are expressed, here is one example:

*“I changed to the rice/wheat system about 20-25 years ago. I used to permanently cultivate sugarcane, wheat, green beans, maize and mustard. The rice needs more attention and water, but I am happy with the change, it provides me higher profit”.*

(Akalbir (56) farmer and director of the Co-operation society in “Pind”)

Important to note here is that sugarcane is in fact very water demanding. However, back in the days when cultivation was more diverse than the water demanding paddy cultivation of today, the sugarcane cultivation did not reach up to today’s high levels and the water resource was therefore not under the same pressure.

Naturally, since the farming system of the village is wheat-rice based, the lack of rain with the subsequent need to use more groundwater puts a toll on the water resource.

Farmers in “Pind” avoid drip irrigation. The feeling is that drip irrigation will not provide the rice and wheat with enough water, the cost of the technology is also too high.



*“Drip irrigation is not implemented to the farm because it costs too much even with subsidies. Drip irrigation does not provide enough water either. One positive thing with drip irrigation is that we would have needed less pesticide. Farmers cannot collaborate and buy drip irrigation together because we’ll only start fighting”.*

(Mandeep (26) IT graduate and farmer’s son).

Droughts have not only been handled with the help of generators, but also with the help of the Punjab government or the central government, who have given farmers money based on the farmers’ loss per killa. The drought of 2009 provided farmers with certain problems. But the flood of 2010 served farmers with a totally different working environment, although the sudden heavy monsoon rain did not affect the district where Pind is situated as significantly as other districts. However, the high diversity in the weather behaviour does serve as an example of the need for the farmers to be flexible.

#### **5.5.4 Fields**

The farmers are dedicated to a rice-wheat farming system. The rice being sown in the warm and wet kharif season and the wheat being sown in the colder rabi season. Farmers and then especially joint families dedicate part of their field for the cultivation of vegetables meant for home consumption. The reason this strategy is most popular amongst the joint families is because there are enough workers among them in the family to manage the vegetables, since vegetables generally need more care. The vegetable part of the field is managed organically while the other part dedicated to wheat/rice is managed with the help of chemical input.

During the kharif season the rice is fertilized with large amounts of dung. An example can be provided with the farmer who owned 3 killas and used 2000 kg dung per killa for rice. (Important to note here is that farmers tend to use much more dung than this per killa). In addition the farmer used about 200kg of what he classified as chemical fertilizers.

The farmers classify Urea as a chemical fertilizer. Urea is used in the rice cultivation although farmers believe that it is the cause of several health problems in the village. Zinc, potassium, dye, gypsum, calcium (DAP), zinc sulphite are also classified as chemical fertilizers by the farmers and are all used in various mixes and doses for fertilizing rice.

Large amounts of dung are also used in the rabi season. The farmer used as an example above regarding fertilizing of the rice, may serve again as an example. In the rabi season he uses

2000 kg dung for fertilizing the wheat. Again it is important to be aware that most farmers use much more dung than this per killa. Chemical fertilizers are used in rabi season for wheat in varying mixes and doses. Farmers prepare the soil first with dung, and then when the seeds have been sown and the plant has grown they use chemical fertilizers.

Dung is regarded as essential for the success of the crop, as this farmers stated.

*“We used to only use dung for fertilizing the field, but then we started to use chemicals for fertilizing and the soil got depleted. Now we have to continue to use chemicals in order to make a surplus, without the dung that we mix into the soil we wouldn’t get any surplus”.*



(Harbir (52) farmer and former worker for chemical fertilizer company)

The farmers are also dependent on the chemicals due to the need to remedy the chemical inputs impacts on the soil. Therefore they have become not only dependent on the use of more and more chemicals but also of dung.

Picture 5.10 Wheat fields

Due to the fact that dung is a very important resource for the farmers and the fact that the milk produced by the animals provides an additional income for many, the need for fodder is crucial. The berseem plant will provide the farmer with 4-6 cuttings before the berseem season is over, when he is finished with one process of cutting, the berseem from where he started the daily cutting will have grown enough for the next round.

Mustard is additionally cultivated for fodder, although mustard is also used for home consumption. In between the wheat and rice season the lentil moong daal is cultivated, the farmers state that this is done in order to properly utilize the field.



Picture 5.11 : Berseem



Picture 5.12 : Mustard

The farmers are experiencing that their soil is losing fertility. One farmer had performed an analysis on his crop and had found that his soil was lacking iron, zinc, sulphur and manganese. Iron was lacking the most and manganese lacking the least.

In “Pind” it is not unusual for the farmers to sell their top-soil to brick kilns. There are several brick kilns around the village and one can see traces from a multitude of previous sales by the difference in the elevation of farm land. The sale provides the farmer with easy money in the exchange of 3-4 feet of the top-soil. The problem with this strategy is that the soil loses its fertility. But the prospects of earning 80-100 000 Indian Rupees per killa sold does encourage farmers to make a deal.

The good quality of the soil in Punjab is perfect for the brick industry. As stated by Singh and Asgher (2004, p. 597) “For making of raw bricks good quality fertile alluvium soils are preferred. Best quality bricks are produced from best quality fertile soils. The availability of good fertile alluvium soils in North India especially in the Gangatic plains, make the fringe areas in north Indian cities be dotted with brick kilns”.

According to farmers the soil in Pind is mixed with sand. The sand used to be diverted and guided with the wind to become dunes, but due to the many trees that used to decorate the landscape now no longer there, there are no longer any diversions. However, farmers do use sand in order to level the fields.

Farmers state that they are experiencing an increase in plant sickness. Yellow rust, blackening



Picture 5.13 Brick kilns

of the leaves and rolling of the leaves has become a big problem in the area and is attempted remedied with the help of pesticides. Also bugs that destroy the crop have become an increasing problem, thus the need for insecticides have become even more crucial. Also competitive plants are an increasing problem and so the need for herbicides is also increasing

Also the need for farmers to actively change their seeds every so often is necessary in order to maintain a steady production and reduce the need for more chemicals. As a farmer stated:



Picture 5.14 Farmer checking his crops

*“Decreasing water level and the fact that we use the same seeds for too long leads to reduced productivity, therefore we change seeds every 2-3 year. Now we can change seeds every year because of my brother in law”.*

(Mandeep (26) IT graduate and farmer’s son).

It should be noticed here that the farmer does not only express an earlier lack of ability to buy seeds as often as needed, but he also

makes a statement about the decreasing water level as a limiting factor to the production. The brother in-law referred to owns his own fertilizer/pesticide and seed company

*“At the moment I am experimenting with three new wheat varieties. I do this every 4-5 years because the old varieties also made by the PAU need more and more chemicals”.*

(Baldeep (32), farmer)

To change seeds is a strategy that is given very much attention from the farmers. An example of this can be the farmer who had bought new seeds from the PAU (Pusa 44, Pusa 201, Basmati 1121, and PVW343) because of expected higher produce and more resistance to plant sickness.

The farmers in Pind do not own barani land (rainfed land), but are dependent on sanchai land (irrigated land). All of the land is cultivated, except for the farmers who have sold their top soil to the brick producers. A majority of farmers sharecrop while a minority of the farmers only cultivates the killas owned by themselves. When it comes to sharecropping there are many farmers who lease from absentee landlords. The majority of farmers own less than four killas while a few stick out by owning over ten killas and even 25 killas. When sharecropping the biggest farm registered reaches over 35 killas, while the more normal sized farms are 7-10 killas. The landowner of the sharecropped land is the one who makes all the decisions about the rented out land. The farmers who suffice with the killas that they own ranges from owning 2 killas till as much as 15 killas.

The farmers in the village produce enough food for their household, and every farmer produces enough to get a surplus. In table 2 an overview of the earnings in one year is presented. Farmers do in general earn about 15-30 000 Indian rupees per killa. However, the numbers may vary according to season, quality of the product and the settled fixed price of the season. Some precaution must also be advised in regards to this data, as stated in chapter 3. (The numbers have been rounded up accordingly, in regards of simplicity)

Indian Rp. Earned	Nr. Farmers
1.500 000	2
900 000	1
700 000	1
600 000	1
500 000	4
300 000	3
200 000	16
150 000	3
100 000	8
60 000	3
40 000	2
	44

**Table 5.2. Annual wage (2009)**

Most of the farmers have not attempted to cultivate any new crops during the last ten years, but some have. Moong (daal), maize, potatoes, onions, pulses, tomatoes, radish and bhindi (ladyfinger) are all plants that farmers have started to cultivate. The farmers' incentive for cultivating these plants is home consumption.

About 20-25 years ago the farmers were in general devoted to cultivating a variety of crops for commodity, amongst them cotton, maize, groundnuts, sugar cane, green beans, but the prospect of gaining more profit with the rice/wheat system changed the crop basis for the farmers.

#### **5.5.5. Livestock**

It is usual for a farmer to at least own one or two buffaloes for dung and milk products.

Buffaloes, cows and oxen are the more common animals in Pind. But a farmer stated that he owned 35 pigs and another one owned 25 geese and chickens. Some farmers have many chickens. Also goats are represented among the village's animal inhabitants. A few farmers also own horses. Forty-two farmers owned 318 animals (Oxen, buffaloes and cows).

The animals produce dung used in the fields and as fuel. A woman stated that her five buffaloes produced about 15 tons every sixth month, where half was used for fuel for cooking while the other half was used as fertilizer in the fields.

The farmers seems to be in a need for more and more dung due to their attempt to remedy the chemical fertilizers affect on the soil with the help of dung. It is also needed for organic

subsistence farming for home consumption. A woman stated that even though the family would like to manage the farm fully organically, instead of half and half as was the case now, they weren't capable because they did not have enough animals to produce dung for that type of farming.

There are many dairies in the village encouraging farmers to sell their dairy-products to them. However, it seems like the main focus is to first and foremost ensure that the consumption needs of the farmer's family are met. A few do own up to eight or ten buffaloes. The buffaloes are preferred because they are quite hardy when it comes to temperature. The buffaloes are contained and chained up in the household's courtyard. If there is no room for this, the animals are kept in the governmental forest. Some cows are also kept like this, but the usual strategy for the management of cows, and then especially bullocks and older cows, is to let them go loose. This strategy may be a nuisance for car drivers and farmers who get their crops damaged by "*a gang of stray cows terrorising the area*" (as one farmer described them). This strategy does however save the owner of the animal(s) space, fodder and work. The trading of buffaloes, cows, horses, and even ducks is an important income for the households. Several farmers are more or less active in the business of selling and buying these animals. The horse is also a source of income through the business of passing on the horse's good pedigree.

Farmers feed the buffaloes, cows and oxen with berseem, mustard and/or dried rice and wheat residue. When having to choose then farmers prefer wheat residue before rice as fodder since it is regarded to be more nutritious. Naturally the berseem and the mustard take some much needed space from the fields that potentially could have been cultivated with wheat or another crop.

During critical periods of fodder, approximately in the end of rabi season and in the end of kharif season, farmers feed their animals with wheat and/or rice residue. A few farmers feed their animals green millet, cauliflower and potatoes during critical periods for fodder. Dried maize residue was also observed fed to buffaloes.

#### **5.5.6 Governmental forest.**

The governmental forest is better described as a narrow row of woodland stretching about 30 meters between the river bed and the fields. It consists of eucalyptus trees that stand for as far as the eyes can see along the river bed. The trees are all marked with numbers, indicating that each tree is governmental property and must therefore not be cut down. Here farmers place

the buffaloes that they don't have room for behind the locked gates of the household. The forest provides much needed shade for the animals.



Picture .5.15: Buffaloes and cows

Picture 5.16: Honey production

The forest also functions as storage space for rice and wheat residue that farmers have not found any room for elsewhere. Large piles of the residue lie safely around in the forest.

Several man-made bee-hives are placed in the forest and several honey workers inhabit the area with tents, making sure that no one tries to steal either the bees or the product. The owner of the bee-hives is not from Pind but inhabits one of the other villages nearby. The farmers of Pind generally regard the honey production to be a



Picture 5.17 Dried residue for fodder

waste of time due to the hours and money that is needed to spend on workers. The bees do however help pollinating the crops.

### 5.5.7 Market

The mandi (market) is arranged twice a year in the village, for rice and wheat respectively. The mandi is held in the village, this means that the farmers don't have to put much effort into transporting the product. The market is focused towards the wheat and rice, which means that the farmers, although eager to try other crops should the fixed pricing system include other crops at a good price, stick to the rice/wheat cropping system. An informant stated that other crops than rice and wheat would be hard to sell because the market for a greater variety of crops is not as close as the market for the wheat and rice. As stated by a farmer. *"The market is bad. We would have to travel far away and the ice-truck we would need to rent costs a fortune. The government does not hand out subsidies for us to travel to markets far away. If*



*they had, then we would have cultivated a variety of crops, because the soil gets better if we change crops annually”.*

(Mandeep (26) IT graduate and farmer’s son).

Since the farmers do not have any storage space for their produce it is important that the government comes to fetch it as quickly as possible after the harvest. Also some private traders are in the market ready to make a deal. A well known problem in Punjab is the governmental failure to come and pick up the produce. When this happens frustrated farmers will often feel forced to make a panic deal with a private trader at a lower price. Also, the chance of the product being left to rot is an issue that is a well-known problem, as a governmental official high up in the system told to me:

*“It is a paradox that we produce so much food in Punjab which is left to rot in a ditch, while so many people in other states are left hungry”.*

Still the market is what the farmer works towards during each crop season. Here he can make a profit based on his products’ quality and the pricing set by the government.

### **5.5.8 Co-operative society**

Basically the Co-operative Agricultural Service Society is the main institution that fuels the farming system. The Society functions as a kind of a bank for the farmers as it provides them with easy loans at a small interest rate. The Society provides information to the farmers about farming in general, sells fertilizers, pesticides, seeds and rents out farming equipment (for sowing).

In Pind about 516 farmers are members which mean that almost all the farmers in the village are members according to the director.

The Society is much respected in the village and has enabled farmers who would not otherwise afford to do so with help to buy or hire new equipment, and get loans. The Society also provides the inputs on time.

The director is the one who decides what to buy and store at the local Co-operative society. The government sends him a catalogue and he focuses on wheat and rice because the MSP (Minimum Support Price) on wheat and rice is more implemented than the MSP on cotton, maize, green beans and sugar cane. When it is time to harvest the Society will inform farmers of the set prices of the season on a black board outside the Society’s office. However, a new strategy for improving farming is now attempted implemented. Outside the Society’s office

hangs a poster, an advertisement by a mobile phone company, saying that, if a farmer gets a SIM card from the phone company who had this ad and recharge it according to a specified plan the farmer can then get information about weather conditions, market price information on crops, the prices of other commodities (for different city markets), fertilisers, national and international news, information on agricultural issues etc. The service can be given in whatever local language through SMS. This could potentially make it easier to get an information flow out to the farmers. The ad is quite in accordance with a working paper from The Indian Council for Research on International Economic Relations, (2010) who sees mobile phones as a source of further development and an end to decreasing productivity.

### **5.5.9 Wage labourers**

Workers are needed in order for the farmer to cultivate and manage his crops according to its specific needs. However, there are now problems facing the farmers with regard to employing help. Further, the rice law of 2008 has led to farmers having to start the rice cultivation more or less at the same time. This has ended up with workers demanding higher wages. Farmers also see that the lack of workers discourages them from introducing new cultivars into their fields, as stated by a farmer.

*“I started experimenting with new plants in order to satisfy my curiosity and so I introduced moong daal to my fields in order to make use of the time between the wheat and the rice season. But after one season I had to end the project because of labour problems”.*

(Gatnam (60) Farmer and panchayat member).

Workers from Uttar Pradesh are quite common in the village, and they also often serve as farmers' servants. The migrant workers from U.P do seem to help dampen some of the problems regarding labour shortage in the village. However, the workers' riots in Ludhiana district in the late winter months of 2009, caused by the workers reaction to low wages and workers' welfare seem to make it safe to say that there may be some difficulty regarding the employment of migrant workers as well as the Harijans, who were referred to by Anonymous, 1991).

## Chapter 6. Constraints and Potentialities in future farming

Here I will briefly sum up the findings in chapter 5 before applying them into Bateson's system of flexibility in order to make a diagnosis of the current flexible agricultural environment of Pind. The path dependency created both by exogenous forces as well as the village's cultural system, and the blame-game that these dependencies have created, are recognized. The recognized potentials advised through Bateson's system of flexibility as well as the cultural constraints and other constraints that affects these, are forwarded. I will end the chapter by comparing Pind with Manang.

### 6.1 Summing up

The farming system of Pind is two-fold, of which the main part is devoted to commodity production whilst the other is focused on subsistence organic farming. The commodity production is a wheat/rice cropping rotation that needs high input intensity in order to get a high output. The need for more inputs is however increasing while the output is declining. There are several factors that are the cause of the declining output and these have all been demonstrated through the presentation of the different variables that constitute the farming system.

Through the presentation of the cultural information system, the importance of family, *izzat*, religion and external dependencies in agriculture is evident. Family and conspicuous consumption are important as tools for the farmer to try to raise his *izzat* through his skills as a farmer. Religion also plays a part in the farming strategy through its belief in a pure body and mind, and that this can be achieved by organic farming.

It was demonstrated that the top four most necessary input requirements for the farmer to be able to produce more crops with the farming system of today were, more water, more manure, more workers and more pesticides. Findings show that the farmers recognize some of the negative effects external dependencies have on their farming but still allow this dependency to continue despite the resulting depletion of resources in the commodity part of the farming system, because of the increased profit they get from, for instance, the fixed pricing system .

### 6.2 Constraints and potentialities

Before grasping the farmers' uncommitted potential we must recognize the difficult situation of the commodity agriculture in Pind. Although presenting solutions that would prove

valuable in an environment where the water resource is heavily reduced and there are consequences because of changed weather conditions, the issue of the soil being depleted certainly reduces flexibility and then, ultimately, also potential.

When applying Bateson's system of flexibility this claim may become clearer.

Farming for commodity practised in Pind is in fact very unsustainable when it comes to flexibility. Recognizing the farming strategy of Pind for coping with changes as sustainable or unsustainable, one sees that although the farmers recognize the declining water level and the depleted soil, several different variables that add up a farming system are pushing their tolerance limit with the intent to create more flexibility. By doing this the variables are also influencing other variables in a less than sustainable way, thus making the system unsustainable.

The water variable is a prerequisite for the system to survive. The tolerance level of the water variable is constantly being pushed to its limit, since the aquifer is being used beyond nature's capacity to renew the resource before one digs deeper into the ground to the next aquifer. This is done with the help of new technology. Aided by new technology within HYV and chemicals the soil variable is also being pushed to its tolerance limit.

The intent of the government, scientists and farmers has been to make the soil better suited to rapid production with the goal of achieving maximum kg output per killa from the soil with a minimum of effort from the producer. But this has led the soil to become depleted and even more dependent on chemicals and, above other things, manure and water.

An experienced increase in the need for insecticides, herbicides and pesticides is also evident and can be claimed to be connected to the overall use of chemicals, since insects, competitive plants and plant sicknesses develop resistance. The increase in the need for manure means that the need for animals will also eventually increase and this in turn will mean that more of the field will have to be devoted to fodder instead of human consumption.

In this environment the need for more work per produced kg, has increased, but the work labourer variable is in fact not moving parallel with the other variables. On the contrary, farmers state that the shortage of workers is restricting their production capacity, but this also means that the unsustainable development of the farming system is restricted The depleted

soil, the increased need for input and more workers also results in diminishing returns for the farmer.

It is possible for the system to continue along this path, and that the water and soil variable can be pushed even further, and that the dung, fodder and work labourer variables do have the capacity to contribute more to the system. Even the farmer, although not happy about it, might be capable of buying the much needed input, pumping systems, veterinary bills and labour wages. But the system will eventually come to eat up its own flexibility. The system is quite simply not sustainable as it is.

A negative spiral has been created which can ultimately result in more or less barren land if measures are not taken. In addition farmers sell their top-soil to brick producers, thus leaving the field unfertile. Farmers recognize and understand the problem regarding their farming system, but they are in a sense pressured by a necessity to continue along the path of dependency, a path that has largely been laid and paved by governmental incentives.

The issue of izzat should also be mentioned. Being a good farmer is, as stated, a precondition for him to be able to raise his family's rank in society, and the degree of his success will be expressed in what the farmer has earned and what he can afford after the harvest, like raising his social merit (izzat) or simply showing off conspicuous consumption, which can, among things, be expressed through buying and using more chemicals than recommended with depleted soil as a result of this.

A prerequisite for a farmer to be able to provide the actual capital which can enhance his izzat through investment in farming, education, migration and marriage is the farmland itself. The consensus of opinion in the village is that one best achieves a good profit through water-demanding Green Revolution products. Rice and wheat are stated as providing the highest profit and the farmer therefore continues with this type of cropping rotation.

Thus unsustainable solutions are still the tool to solve issues that require solutions to cope with present issues. Because of this, solid sustainable solutions seem somewhat insignificant, but nonetheless need to be addressed as an existent challenge. The subsistence part of farming in Pind does however provide the farmers with flexibility for their own consumption. The variables here are functioning together in a completely different manner than the variables for

the commodity farming. Here variables are not pushed to their limits in an attempt to maximise intensification by the use of chemical fertilisers. The production of vegetables, lentils, beans etc is restricted by how many family members need to be fed, and who are available to contribute to the cultivation and management of animals for dung and milk. The organic farming practised due to religious belief in the purity of body and mind, and the diversity of cultivated food, helps to keep the soil fertile. The challenges that will need to be faced here under changing production conditions are therefore different from those of the fields used for commodity although the need for water and dung is also evident here.

I have concluded that the commodity part of the farming system is an unsustainable system that will ultimately end up eating its own flexibility. This is no secure basis for handling the expected future changes for production. Bateson (2000) states that the solution is to rebuild flexibility and to save up unexploited capacity that can be spent when faced with change. This means that the flexible capacity of the system's variables needs to be ensured by not pushing the water and soil variables to their limits.

However, this is not an easy task since commodity production is largely secured through governmental incentives even though it is ultimately the farmer who manages his own fields. As one farmer stated:

*"... climate and changes related to climate make farmers flexible, we have to be flexible. But at the same time farmers cannot be flexible because we have to make money and that means that we have to use water".*

(Akalbir (56), farmer and director of the Co-operation society in "Pind")

It is the government with its agricultural incentives who settles the basic work environment for the farmers, for instance through the fixed pricing system, the Co-operative society and the system with seasonal markets where government officials come and pick up the produce. However, there are implications to this that ultimately have a negative effect on agriculture and supply but could be solved if the government were to 1. Change the price and demand through the fixed price system.

The market arranged in the village is directed towards rice and wheat cultivation. This means that the farmers stick to the rice/wheat cropping system although eager to try other crops should the fixed pricing system also include these as to make a good profit. Farmers are not

happy about this situation and state that the monoculture system of wheat/rice cultivation is not good for the soil and they would prefer a more diverse cropping system.

## 2. Better the storage.

The farmers do not have any storage space and are therefore dependent on a fast transfer with the government officials who pick up the product. However, the government failure to come and pick up the product as required is evident. And farmers will therefore often make a panic deal with a private trader at a lower price to avoid the possibility of being left with a produce that is rotting and unsalable.

It is important to be aware of these issues as they have serious implications on food security.

In the following focus will be to look at the potential to end or reduce the threat of pushing the variables to their limits, in order to create flexibility.

Farmers recognize that more water, manure, workers and pesticides are needed in order for them to produce more crops. Of these, it seems that their main priority is more water and dung. I will therefore first focus on these elements before suggesting some potentials that may also have some value.

### **6.2.1 Water**

The fact that farmers state that water is currently restricting their production does not bode well for food security since the prospect of reduced water resources in the future due to climate change will worsen an already existing problem. As demonstrated, the groundwater resource has repeatedly reached its tolerance level as the farmer uses up the aquifer before reaching further down in the ground to the next source. Questions of interest are: How long can this strategy go on before there is perhaps no more water left? And how far down is it possible to go before it becomes economically unsustainable to continue due to high expenses for water extraction? With the current management of the farming system, the river channel system and the groundwater will, if future scenarios prove to be true, become heavily reduced. A monsoon that might become heavier can help to reduce some of the effects, but the best farmers can do to cope with the situation is probably to:

### 1. Change crops

Although preferred due to higher profit, farmers point out that the paddy needs more work and water than former crops cultivated. About 20-25 years ago the farmers were generally devoted to cultivating a variety of crops, which was good for the soil.

The fact that Paddy rice is one of the most water-demanding crops will not go well with the future projections of water shortage.

A change from rice to wheat, green beans, maize and mustard, some of the crops that were cultivated before the implementation of the Green Revolution technology, might be a wise move faced with climatic change. Since the fixed price system also applies to some of these the economical loss should not be too great.

A more diverse utilization of the soil will help to remedy the depleted soil resource while at the same time the need for workers as well as watering will be not only reduced, but also more spread as the different crops need different nurturing and harvesting. The current problems regarding bugs, competitive plants and plant sickness that might increase due to higher temperatures in the future, might also be reduced since different crops are vulnerable to different threats.

### 2. Water harvesting

There are several dried out wells that lie dotted about in the fields close to the sheds. These wells may again prove to become a valuable resource as they provide the opportunity to harvest water. Rain water may fall naturally into the wells but can also actively be directed with small channels and small "pools" that can be placed on top of the rooftops of the sheds. This of course will be an intrusion on the hydrological circle and will have some effect on the river channel and ecology.

Farmer's state that they cannot afford to buy drip irrigation and that the drip irrigation will not give the crops a sufficient amount of water, this can however be debated. Drip irrigation does not have to be expensive drip irrigation can be secured by for instance making holes in hoses.

### 3. Better river irrigation channel system

The channel water has difficulty in finding its way to the distant fields due to bad maintenance of the irrigation system, this means that many farmers rely solely on groundwater.



The channel water cannot replace the farmers' dependence on groundwater. The channel water does however reduce the farmers' dependence on this, and this in turn helps to reduce but not remedy the pressure on the groundwater resource.

A cultural constrain to agricultural solutions, like the use of the river channel system is however important to be aware of. "Abhorrence of surrender and respect for a good fight" is generally highly valued and is an indication of the general milieu in the village, and may serve as an example of the tension between various groups in the community. However, because of the various exhausting conflicts and disputes in the village, farmers tend to try to avoid certain agricultural strategies such as the river channel irrigation system. By avoiding this option the farmer is then basically only left with dependence on groundwater.

### **6.2.2 Livestock**

The farming system needs more dung in order to secure output. The continuous depletion of the soil through over usage of chemicals and mono-cropping means that even more manure is likely to be needed in the future. However, to add more animals to the farming system would not necessarily be a good solution since this would mean that more of the field would need to be diverted to the cultivation of fodder at the expense of food production. There are however some solutions that can help the situation:

1. From fuel to fertilizer

Despite the fact that modern gas-stoves are common, people prefer to make food on the traditional out-door stoves that are fuelled by dung-cakes since this gives the food a better flavour and the household saves the expenses for gas by using the dung as fuel instead. One woman stated that her five buffaloes produced about 15 tons of dung every sixth months, where half was used for cooking fuel while the other half was used as fertilizer in the fields. This means that if people stop using dung for fuel there would be available 100% more dung for fertilizing the fields. This would mean that the household would get an increase in the cost of gas, but the cost of this might be a small price to pay since the dung is a prerequisite for the farmer to get a surplus from his farming.

2. From waste to fodder

The combine harvester is quite popular. However, the combine harvester leaves the waste straw on the field and farmers burn the residue during the rice and wheat harvest. This of course also means that the farmers are burning potential fodder. Naturally this restricts the fodder potential that could have provided for more animals and thereby also more dung. Fodder potential can therefore be increased by modifying the machines in such a way that the residue is not left on the fields. The PAU might be able to do this, but perhaps the many skilled farm machinery mechanics in the village could find a solution that would work.

### **6.2.3 Extension service**

Other than the Co-operative society, farmers do not consider extension services to be of much use. Stating that the technology developed at the PAU is of little relevance for them, the farmers also state that the PAU, which, among other things, is meant to help to improve farming, advise farmers and otherwise be at their assistance, is generally avoided by the village farmers because they feel that the scholars are not showing them enough respect. This of course creates a bad environment for the information flow. When also realizing that the scholars tend to avoid the rural areas where the farmers are, it is evident that the relationship needs to be improved.

Although this cultural restriction is evident, efforts to improve the relationship must and should be attempted. One tool for achieving this and making farmers more aware of the problems they face, and possible solutions, is based on information and communication through the mobile telephone system and the use of computers.

A new strategy for improving farming is now attempted implemented by private enterprises as well as the government. Mobile-phones are regarded as a solution to end decreasing productivity since it is a source for easy information flow to the farmers. Here information about weather conditions, market price information on crops, the prices of other commodities (for different city markets), fertilisers and the reasons for recommended dosages, national and international news, information on agricultural issues etc. can easily be directed out to the farmers. This strategy might prove to be valuable, since most farmers have mobile phones. Farmers who avoid the PAU will now be able to get advice and general information without feeling subordinate. Another potential might also become evident, the computer is a usual item in the Jaat household, and here the farmer will be able to get easy access to different aspects of farming through articles, pictures and educational videos. The farmer does not

regard the computer as a tool for farming now, but the next generation of farmers will most likely use it actively.

#### 6.2.4 Fields

The fields in Pind are not only threatened by soil depletion due to over use of chemicals, but also by the fact that many farmers sell their top-soil to brick kilns, of which there are many in the village's fields. By doing this the farmer earns easy money in exchange for his top-soil, as much as 80-100 000 Indian Rupees per killa. However, this result in reduced soil fertility, and food production is not possible at all during the lease to the brick manufacturers. Naturally, this constrains food production and needs to end.

Izzat is connected to how many killas of land a man owns, regardless of whether he cultivates it or not. Selling the land is therefore out of the question and absentee landlords rent out their land instead. This means that much of the profit is sent out of the village since many of the farmers in the village sharecrop. The fact that some of the profit from the hard work ends up far away might be discouraging to the sharecroppers, It is also the landowner who makes the decisions on the farming, for example if a submersible pump should be implemented or not. If the landowner is living abroad, as many are, it will obviously be difficult to come to a sensible decision on the farming. Sharecropped land gives less output than land owned by the farmer himself (Aase, 1991). Thus, potential for more crop production lies in the many killas of land that are being sharecropped in the village fields.

These constraints and potentials however, are heavily encouraged by economical incentives and the heavily implemented idea regarding izzat. This issue applies also to the next potential presented.



Picture 6.1 Mobile phones as a potential?

#### 6.2.5 Reduction of conspicuous consumption and spending

The farmer may be tempted to get a quick display of his *izzat* by, for example, buying unnecessarily large farming machinery and/or buying and using unnecessarily large amounts of chemicals. Much money is spent

in the attempt to raise ones izzat, the high dowry's and extravagant weddings can cost the equivalent of several years wages. There is also potential profit that is diverted to absentee landlords through the sharecropping system.

These large amounts of money could provide a capital resource that could instead provide the farmer with less water demanding technology. The projected water reduction in the future will not only take its toll on the water resource, it will also reduce the supply of available electricity. The accumulated capital through the reduction in spending could potentially also be used for future solar energy solutions for the household, since the electricity that is free for the farmer is only free in the fields. This solution might also prove valuable in the fields in the future.

The reduction of conspicuous consumption regarding chemicals is worth a closer look.

Farmers admit to modify Green Revolution technology by mixing and using more chemicals and pesticides than recommended because the soil is claimed to need more and different dosages than recommended. Farmers also state that old HYV needs more and more chemicals and they find it difficult to shift seeds as often as they should to avoid this. Potential profit which lies in the conspicuous consumption of today could make it easier for the farmer to buy new seeds and by doing so reducing the perceived need to use chemicals.

### **6.3 Blame-game?**

Farmers have been blamed for being the cause of the depleted soil and reduced water resource.

The farmers are dependent on electricity because of the need to pump up ground water. Electricity is a resource that is free in Punjabi agriculture. Because of this many have blamed the governmental management of the resource for making farmers irresponsible with the use of not only electricity, but also of the groundwater itself. Some believe that higher electricity prices for farmers would reduce the problems of declining water levels and the massive shortage in electricity.

However, farmers are only provided with 2-3 hours of electricity per day despite the governmental promise of providing them with 8 hours. This means that farmers actually have to buy generators and petrol for extracting the much needed water, on the other hand this give an incentive for some farmers to make use of the water channel irrigation, thus reducing the pressure on the groundwater. Also the soil depletion is blamed on farmers, stating that because of their mismanagement of the chemicals and pesticides the soil has suffered. The

chemicals are considered to a large extent to be a cause of the negative spiral. On the other hand, farmers firmly believe that modification of recommended dosages is needed since the quality of their soil differs from the good test-soils of institutions who recommend dosages. So, is the situation the government's fault since it implemented the technology in the first place? Or is it the institutions who fail to remedy negative effects? Or, is it perhaps the farmers themselves?

Whatever the case, farmers have been drawn into a negative spiral of resource use, and whoever is responsible, the problem still exists.

I have now presented the most important identified potentialities of the farmers of Pind to adapt to changing production conditions and the role the cultural system of Pind has on agriculture, and how it can affect farmers' potential to adapt to change

I will now focus on comparing Pind with Manang.

#### **6.4 The Plains compared to the Himalayan Mountains**

Aase (et al 2009) represents a highly diverse society in their exploration of the Himalayan farming system of Manang, a society which is situated far from the nearest road and can only cultivate in the summer months due to its semi-arid and temperate climate. Irrigated channels are fed by water from glaciers and snowmelt streams. Farmers keep a variety of animals that are led to summer pastures on village commons. Winter fodder for the animals is supplied by crop residues. Soil fertility is managed with the help of manure. The amount of animals one is able to keep the more fertiliser one will be able to get, thus providing more crops for the subsistence farming practiced.

Aase and his fellow scholars state that the size of animal herds and the cultivated area is in balance. When applying this to Bateson's flexibility system this means that the variables that signify the farming system of Manang work together in harmony, moving in accordance with the agricultural calendar, and never in such a way that a variable is being pushed to its limit, or the threshold itself being attempted moved.

Aase and his fellow scholars conclude that the farming system of Manang is quite capable to adapt to climatic change whatever these changes might be. Four adaption strategies are pointed out as being important without changing the farming system itself.

1. Reclamation of abandoned land: Due to migration Manang faces a situation where 60 percent of the land is no longer cultivated.
2. Substituting wheat for barley: Two types of indigenous barley types are grown in Manang. The staple is perfect for the farming conditions and grows under many different climatic conditions. The more water-demanding wheat is however gaining popularity.
3. Reduction of conspicuous consumption: Horses are regarded as a sign of wealth in Manang and are claimed to consume 16 percent of the cultivated land.
4. Spatial relocation of cultivation: relocate farms to valley bottom –land where water is plentiful.

Although the soil managed for the subsistence part of the farming in Pind does provide the farmers with flexibility for the food security for their families, Pind cannot be claimed to be a flexible farming community because of the commodity part of the farming.

External dependencies can be claimed to be a restriction to the flexibility of Pind, but also cultural issues can have implications to farmers` flexibility, and path dependencies by these two makes it hard to change the situation.

However, external dependencies and cultural constraints are also evident in Manang since governmental land policy has unintentionally resulted in migrated farmers not leasing out their land due to sharecroppers new rights to, under certain conditions, claim ownership to half the land they cultivate. Farmers are not allowed to sell their own land to non-Manganese despite the fact that it is theirs. This is because the endowments are placed with the ethnic community. Because of this 60 percent of the land in Manang is not cultivated. The fact that horses are a sign of a farmer`s success serves as a conspicuous consumption that is consuming 16 percent of the cultivated land, and is another cultural constrain.

Governmental effects on agriculture in Pind have had a bigger impact than that in Manang. And the cultural constraints that are recognized in Manang do also serve as impressive potentials to increase food production. Cultural constraints recognized in Pind can also be turned into potentials, although, without having such an impressive impact as in Manang.

Overall it seems evident that the farmer`s basis for handling future climatic prospects is better in the Himalayan areas. The fact that the Green Revolution`s technologies have not managed

to get a foothold on the agriculture in Manang means that they have avoided the negative consequences and external dependencies that the plains are experiencing, and this alone means that the farmers in the mountains have a more solid base for handling future prospects. I have earlier presented the constraints and potential of the village Pind. Although potential quite clearly is evident also on the plains, in Manang the farmers actually have the potential to multiply their crops without making too many changes. In Pind the potential for increasing crop production is quite minimal in comparison to Manang. The farmers of Pind have produced maximum of what they can get out of the soil, and every bit of land available has been cultivated (except for land diverted to brick manufacturing). The fact is that the farmers will have great difficulty with diminishing return if the farming system of today continues. Therefore when presenting the potential of Pind, focus is not only on how to manage changing condition of production but also how to remedy the depleted resources.

Farmers of Pind state that the number one most limiting variable to their production is water. The fact that water is a problem today does not bode well for the future, and we will be faced with climatic change that will further aggravate water problems. However, I have demonstrated that the variables of water and manure, which is considered to be the two most restricting variables on production, can be strengthened.

The farmers of Manang have the potential to work under the different conditions the various altitudes provide them with. This is not the case for the farmers of Pind on the low lying plains who in addition to degraded resources also have no further land to make use of since every bit of land is already cultivated except for the fields that are used for brick production.

To reduce the amount of cows, buffaloes and oxen would not help in Pind as it did in the mountains regarding horses. This is because the farmers must have manure to fertilize their soil be it the subsistence part of the farming or the commodity part. In fact more manure is needed, thus only the part that is used for cooking could provide more for fertilizing without having to add more animals. Potentials in Pind are indeed evident. And constraints like external dependencies, side-effects of the Green Revolution and cultural baggage dampen farmer's flexibility. However, although Manang does prove to be the most flexible and has greater potential for food production, Pind may at least be able to sustain the production levels of today for some time if the chemicals is reduced to the recommended dosages (if one assumes that there is an over usage of chemicals) and dung is diverted from fuel to the fields.

However, if this is not done, the reduced economical returns might eventually be the incentive for farmers to make a change. But reduced water supply (whether due to climate change or general difficulty with extraction) and other projected production changes will also ultimately have an effect on the production, and this will then make it necessary to consider a change in crops.

The potential in the active usage of computers and mobile telephones for better information-flow, new water-saving irrigation schemes, a shift in crops, reduction of spending for conspicuous consumption as well as the large amounts of dung and fodder that potentially can be relocated to agriculture, might prove to be quite valuable for coping with production challenges of the present and the future.

However, the elements that add up to being a solution in Pind call for a change in the farming system that reverses the pushing of the variables threshold. The potentials are there, the farmers only need the incentive to take advantage of them.

Since both the farmers of Manang and Pind are proud farmers and certainly have the will, determination, skill and experience to manage their fields and implement new farming solutions when faced with a challenge, the future may not seem so gloomy after all.



## Chapter 7. Conclusion

The main objective of this study has been to explore Punjabi farmers' potential to adapt to change. To be able to explore this potential I have mapped the farming system, and the cultural system of the farmers. Bateson's definition of flexibility as "Uncommitted potentiality for change" (2000, p 505) has served as my understanding of potentiality.

The main question posed in chapter 1 was:

- What are the farmers of a Punjabi village's potential to adapt to changing production conditions?

A sub-question was also posted in chapter 1:

- What role does the cultural system of a Punjabi village have on agriculture, and how can it affect farmers' potential to adapt to change?

Bateson's system of flexibility, and constraints to potentiality were identified in order to recognize the most important potentialities. It became apparent that focus needed to be on reducing/ending the constant pressure to push the limits further on the different variables that make up the farming system. The potentialities where:

### **Potentiality: 1. Water**

- Change crops

A shift from rice to, for instance, wheat, green beans, maize and mustard, some of the crops that were cultivated before the implementation of the Green Revolution technology can secure a diverse utilization of the soil that will help to remedy the depleted soil resource and reduce the need for workers and watering since these need less nurturing and water than rice. The need for water and workers will then also be more evenly spread through the year as the different crops need different nurturing and harvesting. Problems regarding bugs, competitive plants and plant sickness, might also be reduced since different crops are vulnerable to different threats.

The farmer's skills and ability as a farmer is a precondition to enable him to raise his family's

rank in society. Raising his social merit (izzat), or simply showing off conspicuous consumption in order to demonstrate his degree of success, will be expressed by what he has earned and what he can afford. The consensus of opinion in the village is that good profits are best achieved through Green Revolution products. It is claimed that rice and wheat provide the highest profit and the farmer therefore continues with this type of cropping rotation. This therefore serves as a cultural constraint to the potential that the changing of crops represents.

- Water harvesting

The empty wells in the fields provide the opportunity to harvest water. Rain water may fall naturally into the wells but can also be actively directed there with small channels and small “pools” placed on top of the sheds.

Drip irrigation can also be secured by, for instance, making holes in hoses.

- Better river irrigation channel system

Better maintenance of the irrigation channel system will help the water flow to distant fields. The channel water reduces the farmers’ dependence on groundwater, and this in turn helps to reduce, but not remedy, the pressure on the groundwater resource.

However, there is a cultural constraint to the usage of the river irrigation channel. There is some tension between different groups in the village, and many farmers therefore wish to avoid exhausting conflicts and disputes. The potential for disputes regarding the shared use of the river channel irrigation system makes many farmers choose other agricultural strategies that basically leave them with dependence on groundwater. The pressure on the groundwater is therefore not reduced with the additional usage of river channel irrigation.

### **Potentiality: 2. Livestock**

- From fuel to fertilizer

Diverting dung from being used as fuel to instead being used as fertilizer, would result in there being available 100% more dung to fertilize the fields. Dung is a prerequisite for the farmer to get a surplus from his farming and this would also help to remedy the degraded soil.

- From waste to fodder

Combine harvesters leave the waste- straw on the field and farmers burn the residue. This means that the farmers are burning fodder that could have provided for more animals and

thereby also more dung. Fodder potential can therefore be increased by modifying the machines in such a way that the residue is not left on the fields.

### **Potentiality: 3. Extension service**

The PAU, which is meant to help to improve farming and to aid farmers, is generally avoided by the village farmers because they feel that the scholars do not show them enough respect. The scholars also tend to avoid the rural areas where the farmers are. This cultural constraint naturally also causes problems for information flow.

-Mobile-phones are regarded as a tool to help to end decreasing productivity since it is a source for easy information flow to the farmers. In this way, information about the different aspects of agriculture can easily be directed out to the farmers. Farmers who avoid the PAU will now be able to get advice and general information without feeling subordinate. The computer might also be a positive instrument to better communication and information.

### **Potentiality: 4. Fields**

Many farmers sell their top-soil to brick kilns. This results in reduced soil fertility and reduced food production during the lease to the brick manufacturers. This serves to push the threshold on the limits for soil variables. The short and long-term potential for food production would be better if this practice was reduced, or preferably ended, and the fields and the soil used for farming. Important to note is that I do not claim this constraint to be culturally defined,

Izzat is connected to how many killas of land a man owns regardless of whether he cultivates it or not. Selling the land is therefore out of the question and absentee landlords rent out their land instead. Sharecropped land gives less output than land that is owned by the farmer himself (Aase, 1991). Thus, potential for more crop production lies in the many killas of land that are being sharecropped in the village fields. This practice can therefore be claimed to be a cultural constraint on agriculture.

### **Potentiality: 5. Reduction of conspicuous consumption and spending**

Buying unnecessary machinery and/or buying and using unnecessarily large amounts of chemicals can be used as a quick display of a man's izzat. Relevant to this is the claim that the over usage of chemicals is the main cause of the depleted soil. However, large sums are spent

in the attempt to raise ones izzat. There is also potential profit that is diverted to absentee landlords through the sharecropping system.

These large amounts of money could instead provide a capital resource that could provide the farmer with less water-demanding technology, solar energy solutions and also, to buy new seeds more often and thereby reducing the need to use more chemicals.

Because of the religious belief in the purity of body and mind, the cultural system does encourage farmers with organic subsistence farming. This part of the farming strategy might prove valuable should projected changes develop. The small-scale cultivation for the family needs less water, the cost of cultivation is minimal and the soil is healthy since it is not affected by the use of chemicals.

The caste system defines the wage labourer variable of the farming system. The Harijans have been, and still are, the work force that the farmers depend on for manual labor. However, the Harijans' rising awareness of their rights in society and their search for better opportunities, affect the caste-based work divisions, thereby restricting crop production but also hindering further negative effects that restrict flexibility.

The cultural system plays a role in the farming system in Pind, through the subsistence farming it serves as a source of flexibility, and it serves as a component, together with several exogenous dependencies, in maintaining the unsustainable farming system of today. It is however important to note that similar findings may also be recognized in villages in other countries, be it east or west, with completely different cultures.

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