

Land Cover/Land Use Change: Exploring the Impacts on the Sahariya Tribe of Rajasthan

A Thesis Submitted to the College of Graduate Studies and Research

in Partial Fulfillment of the Requirements

for the Degree of Masters of Environment and Sustainability

in the School of Environment and Sustainability

University of Saskatchewan

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Abstract

The present study explored the changes in forest cover in one tribal region, village of Khanda Sharol, within the state of Rajasthan, India; and examined how these changes have affected access to and the use of Non-timber Forest Products (NTFP) by Sahariya tribal households. The study also examined the implications of changes in the access to and use of NTFP on the livelihood of tribal members and the feasibility of continuing a community-based management system for the sustainable production of NTFPs.

This was a descriptive study. Historical, as well as current data was collected through surveys and interviews. A family information report survey covering various dimensions was administered to each of 365 households of the Khanda Sharol village. Individual interviews and focus groups with tribal members were conducted to gather information regarding NTFP collection patterns (past and present) and details of forest proximity.

This collective study indicates that there was a decline in forest cover which resulted in a loss of compilation of NTFP. Furthermore, there was a decline in the livelihoods of the residents of the village, although a direct and unequivocal link between change in forest cover and livelihood patterns cannot be established. These relationships are complex and simple causal relationships cannot easily be drawn. Nonetheless, this research has been able to identify how changes in the forest cover over the past 50 years have affected access and use of NTFP of the tribal households in the village. In turn these changes suggest shifts in household economic production which then can be tied to poverty, health and education of tribal members.

Key words: Deforestation, BAIF, Non-timber Forest products, Livelihood and Communal land management.

Acknowledgements

I wish to express my sincere gratitude to my thesis supervisors, Dr. D. Natcher and Dr. M. Johnston and to my third committee member Dr. M. Reed for their guidance, support and counsel in the course of study. I have learnt a great deal not only from them but all the other members of the School of Environment and Sustainability.

Appreciation is also due to Professor Ken Ven Rees, the external examiner, for his interest and feedback.

I am also grateful to Mr. Ramesh Rawal (BAIF Vice President) and all staff members of BAIF in Baran, especially Mr. Hari Panchal. My special thanks to Mr. Hari Panchal and his wife for accepting me in their household during the course of the data collection.

Financial assistance provided for this study through School of Environment and Sustainability, Global Partners II, University of Saskatchewan, and Canadian International Development Agency Student for development internship is also greatly appreciated.

I would like to thank my parents, in-laws, friends and well-wishers for their continued support and understanding during the good and bad times of my masters.

Last but not the least, I wish to thank my husband and my children Pallavi and Siddharth for helping me sail through thick and thin. This would not have been possible without their help.

It is my sincerest hope that this research proves valuable to the tribal members who offered their most gracious support, kindness, and hospitality during the course of this research!

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Chapter 1

Introduction

1.1 Introduction

“Changes in land cover, most notably those affecting forest ecosystems, are occurring at an unprecedented rate.” (Randolph, Green, Belmont, Burcsu, & Welch, 2005, p. 105). Prior research studies documents the depletion of forests in India. This loss of forest cover has been attributed to a host of factors, including population growth (Forest Survey of India, 1997; Hegde, 2005; Gulati & Sharma, Undated), the conversion of forested lands to meet growing agricultural and livestock grazing demands (Stebbing, 1982; Vyas, 2008), changes in forest policies that have hastened the unsustainable use of forest resources (Vyas, 2008), and an over-reliance on fuel wood to meet rural energy needs (Laxmi, Parikh, Karmakar, & Dabrase, 2003). Compounding these conditions is legislation (e.g., Wildlife Protection Act, 1972, Forest Conservation Act, 1980) that has set aside large tracts of forest as protected areas thereby prohibiting local use (Vyas, 2008).

Gulati and Sharma (undated, p. 1) clearly sum up the reasons for deforestation by stating as follows: “The predominant causes for dwindling forest wealth have been identified as over-exploitation, overgrazing, illegal encroachments, unsustainable practices, forest fires, and an indiscriminate siting of development projects in the forest area.”

Historically forests provided substantial support to rural economies (Hegde, 2005). There are approximately 250 tribal communities in India representing 7.8% of the total population (Kant, 2000; Hegde, 2005). Because tribal people are, or once were, located in close proximity to forest areas, their livelihoods have in many cases been undermined by their exclusion from and/or the depletion of the forest. Today, many tribal communities in remote regions of India face a daily struggle to survive. Poor health, limited access to services, and forced emigrations to urban areas now characterize much of their daily existence (Hegde, 2005).

It is in this context that this research examined the conditions that have led to forest degeneration in the state of Rajasthan and how changes in the forest cover have affected village households in the tribal region of Khanda Sharol, Baran District. Specifically, this research has examined how changes in forest cover have affected access to and the use of Non-Timber Forest

Products (NTFP) by tribal households. This research was approached with the following objectives:

1. To explore changes in forest cover within the state of Rajasthan, specifically in the tribal region of Khanda Sharol, Baran District.
2. To determine how changes in forest cover have affected access to and the use of NTFP by tribal households.
3. To examine the implications of changes in the access to and use of NTFP on the livelihood of tribal members.
4. To examine the feasibility of continuing the community-based management system for the sustainable production of NTFP.

1.2 Thesis Organization

This thesis is organized into the following chapters. Chapter 1 provides a brief introduction to the thesis and sets out the research objectives. Chapter 2 provides a background to the research and offers a description of the cultural and biophysical landscape of Rajasthan and its tribal peoples. Chapter 3 reviews the relevant literature that informed this research. This includes a brief review of the general changes in India's forest cover. Chapter 4 describes the methods used in this research and the ethical principles that guided my engagement with tribal members. Chapter 5 presents the results of this research. This includes identification of the primary causal factors that have led to the decline and degeneration of forest cover in the Khanda Sharol region and the resulting changes that have occurred in tribal use of NTFP. Chapter 6 examines the current (2010) health of tribal members. While the conditions affecting the health of tribal members are complex and cannot be linked exclusively to changes in forest cover, it will be shown that the challenges associated with access and use of NTFP are nonetheless important and are likely contributors to the poor overall health of tribal people. In particular this chapter will substantiate how the gathering of fuel wood by women and children is proving to be a particular burden and may be having an inequitable effect on their respective health and social conditions. This chapter also sheds light on what BAIF Development Research Foundation has done for improving the lives of members of this village. Chapter 7, the concluding chapter, revisits the

main findings of the research, identifies contributions and limitations in the research, and offers direction for future research in this area.

Chapter 2 **Background**

2.1 Background to this Research

This research is part of a collaborative effort between the University of Saskatchewan (D. Natcher), the Saskatchewan Research Council (M. Johnston) and Bharatiya Agro Industries Foundation (BAIF) Development Research Foundation located in India. The objectives of this collaboration is to pool the collective talents and expertise of each partner in order to collect data on the implications of changes in forest cover in Baran District, Rajasthan; explore the local collection patterns of Non-timber Forest Products (NTFP) by residents of Khanda Sharol village; also to study the impacts of change in the livelihood of these residents. This data can also assist the researchers in examining the outcomes of implementing a village-based management system for the sustained production of NTFP.

BAIF is a non-profit, Public Charitable Trust with a mission to create opportunities for rural self-employment; to help ensure sustainable livelihood; enrich the rural environment; and improve the quality of life for the rural people of India. Mahatma Gandhi established a Nature Cure Ashram in March 1946, in Urulikanchan near Pune, Maharashtra, to promote rural health and well-being. He later turned the administration duties over to his trusted disciple, Manibhai Desai, who directed his attention to livestock production to enhance rural India's milk production capacity. Through his efforts, Desai came to realize that local farmers were in need of research-based support to enhance agricultural output and improve their overall livelihoods. From this point, research and development efforts expanded throughout India; and became established in the states of Gujarat, Karnataka, Uttar Pradesh, Andhra Pradesh, Madhya Pradesh, Uttaranchal, Bihar, Chhattisgarh and Orissa, and Rajasthan. In 1967, a charitable trust under the name of BAIF Development Research Foundation was officially inaugurated by the then President Dr. Zakir Hussain (BAIF Organisation).

BAIF's associate organisation in Rajasthan, Rajasthan Rural Institute of Development Management (RRIDMA) was established in Udaipur on January 30, 1995 with the aim of regenerating degraded natural resources of land, water, vegetation and livestock to improve the quality of life for rural populations in Rajasthan (RRIDMA Organisation, 2006). Through a government grant BAIF and RRIDMA implemented the 'Comprehensive Development of 936

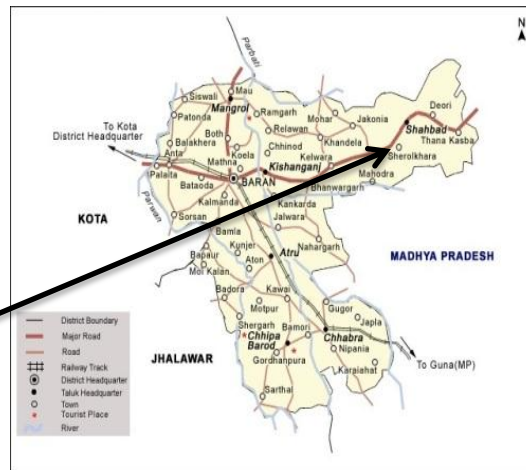
below the poverty Line (BPL) Sahariya Families in Baran District' through the Jana-Utthan approach under the Swarnajayanti Gram Swarozgar Yojana (SGSY) program. The start date of this program was April 1st, 2006 and it was expected to cover 42 villages in Baran district including the village of Khanda Sharol. BAIF has successfully worked in many villages in providing safe drinking water, building washrooms for women, increased awareness of self and house hygiene, increased health status of women and children, helped in capacity building, and helped in addiction problems of tribal people among other things. A communal land to grow trees producing NTFPs for the development of Khanda Sharol was acquired under this program.

2.2 Study Area

This study was conducted in Khanda Sharol village located in Baran District in the state of Rajasthan, India. Prior to 1950, Rajasthan was known as 'Rajputana', the state of the Rajputs to recognize that most of the princely states in that region were ruled by Rajput kings. In 1950, many princely states were integrated together to form the state of Rajasthan (Johnson, 1996). Rajasthan is located in the north-west arid part of India and is the largest state in India with a geographic area of 342,239 km². The area of Rajasthan is equivalent to that of Norway, Italy or Poland (Countries of the World by Area, 2011). Rajasthan constitutes 10.4% of India's total land area, and shares an international border with Pakistan to the west and north-west (Forest Survey of India, 2009). To the north and northeast Rajasthan borders the states of Punjab, Haryana, and Uttar Pradesh; to the east and south-east the states of Uttar Pradesh and Madhya Pradesh and to the southwest the state of Gujarat (see Figure 2.1).

Rajasthan is divided into four major physiographic regions: i) the western desert (the Thar Desert) with barren hills, rocky and sandy plains; ii) the Aravalli hills running south-west to north-east starting from Gujarat and ending in Delhi; iii) the eastern plains with rich alluvial soils; and iv) the south-eastern plateau (Forest Survey of India, 2009). The state has varied climate ranging from semi-arid to arid. The temperature in the state ranges from sub-zero to 50° C and the average rainfall ranges from 480 to 750 mm (Forest Survey of India, 2005).

The majority (91.88%) of the people living in Rajasthan are Hindus, and Hindi is the most commonly spoken language (Joshi, Srinivas, & Bajaj, 2003). The indigenous peoples of Rajasthan speak either Rajasthani or Marwari, although Hindi is the official language of the state. The total population of the state is over 68.6 million (Census, Government of India, 2011).



(http://www.travelindia-guide.com/maps/political_map.php)-- India Map
 (<http://rajasthan.gov.in/rajgovt/misc/map2.jsp>) Rajasthan Map
 (<http://www.baran.nic.in>) Baran Map

Figure 2.1 India Map

The rural population composition is over 51.5 million (75.1%) (Government of India, 2011c). Rajasthan has less than one-third (29%) of its households living in urban areas and the remaining 71% of its households are in rural areas; on average each household has five members (Government of Rajasthan, 2008).

The main cities of Rajasthan are Jaipur, Udaipur, Jodhpur, Jaisalmer and Kota (which is the nearest city to Baran district, where the research site of Khanda Sharol village is located). Ninety-three percent of the Sahariya Tribe members live in Rajasthan and the remaining 7% are spread across the country (Sharma, 2005). The average decadal growth rate of population in this state is 21.44% (see Table 2.1). Since 2001, Rajasthan's population density has increased from 129 persons per square kilometer (Government of India, 2001) to 201 persons per square kilometer (Census, Government of India, 2011); Baran District, located in the south eastern plateau of Rajasthan and bordered by the state of Madhya Pradesh, has a population of over 1.2 million and population density of 175 persons per square kilometer (Census, Government of India, 2011). Table 2.1 shows a comparison of population, sex ratio and decadal growth in India, Rajasthan and Baran District, home of Khanda Sharol Village, the site of this research. According to the provisional census report of 2011, decadal growth in 2001-2011 registered the sharpest decline since independence.

Table 2.1. Population, sex ratio and decadal growth

	Total Population		Sex Ratio (Females per thousand men)		Decadal Growth (percentage)	
	2001	2011	2001	2011	2001	2011
India	1,028,737,436	1,210,193,422	933	940	21.34	17.64
Rajasthan	56,507,188	68,621,021	921	926	28.41	21.44
Baran	1,021,653	1,223,921	909	926	26.08	19.82

(Source: Census, Government of India, 2011)

Rajasthan's landscape has supported two kinds of livelihoods in the region, these being agriculture and livestock production (Kumar, 2005). According to the Investment Information Credit Rating Agency (ICRA) agriculture and related activities account for one-third of the state's income; Rajasthan accounts for 4% of the country's GDP (ICRA Management

Counsulting Services LTD., 2008). Prior to 1990, the state's economy was agrarian and agriculture accounted for 50% of the share of the primary sector. However, this changed starting in 2003 with the announcement of the New Industrial Policy, which led to increased investments in large and medium scale industries. In 2006-07, agriculture and related activities accounted for 31.3% of Rajasthan's economy; mining, manufacturing and the secondary sector accounted for 25.8% and the remaining 42.9% was accounted for by the tertiary sector consisting of Information Technology (IT) and Information Technology Enabled Services and retail (ICRA Management Counselling Services LTD., 2008). However, the industrial and IT related sectors are common in urban centers such as Jaipur, Udaipur, Bhilwara and Shri Ganganagar.

Primary crop production in Rajasthan is based on seasons and is classified as Rabi and Khariff crops. Rabi Crops are cultivated during the winter months when ground water irrigation is available. The major crops grown during this season are barley, wheat, pulses, and rapeseed and mustard for oil. The seeds are sown in October or November and harvested in the months of March and April. Khariff Crops are known as rain-fed crops and are sown in June-July and harvested in September-October. These crops depend completely on rain for their water supply; if there is a good water supply through rains then there is a bumper production or else the production is generally low. The major crops grown during this season are bajra or millet¹, pulses, jowar, corn or maize and groundnut for oil production (Pan India Network, 2010).

Rajasthan is most vulnerable to droughts in the Thar Desert due to unpredictable monsoon patterns (Government of India, 2011b). These conditions affect agricultural production as well as contribute to the desertification in some parts of the region (Johnson, 1996). The drought of 2002 had affected 32 districts with a water deficit of 52% (RRIDMA Organisation, 2006).

Rajasthan also has the second largest livestock population in the country with 49.14 million heads (Government of India, 2009). The state is also renowned for its exquisite textiles: a few examples are hand embroidery; and block printing using vegetable dyes on bed-sheets, which are exported all over the world. Rajasthan is also famous for gold and wax (shellac) jewellery (Johnson, 1996).

¹ Appendix 4 lists Latin and common names of all plant species named in this thesis.

2.3 Forest Cover

The western half of Rajasthan comprises desert, whereas forests are generally found in the eastern and southern parts of the state. Approximately 9.5% of the state's area is recorded as forests (Government of Rajasthan, 2011). In comparison to other states of India, Rajasthan is deficient in natural forest resource (Forest Survey of India, 2005). The floral wealth of Rajasthan is rich and varied; however, Vyas (2008) states that the natural forests of Rajasthan are lowest in terms of area as well as productivity. Moreover, the forests are disproportionately distributed in the various districts of the state. Fifty percent of the forests are over the hilly areas spanning eleven districts including Baran (Government of Rajasthan, 2011; Vyas, 2008). Dense natural forests have been turned into protected patches, mostly confined to various national parks and wild-life sanctuaries. There are five national parks and 25 wildlife sanctuaries covering an area of 9,326 km² (Forest Survey of India, 2009).

About 2.11 million hectares of forest land is set up for land use in 7,114 villages of Rajasthan (on average approximately 296.6 hectares per village; 0.3 hectares per capita). The Forest Survey of India, in its 1999 report, stated that while 14% of villages have an average of 500 hectares of forests, 39% have 100-500 hectares, and 47% have less than 100 hectares forests. This suggests that close to half of the villages in the state collectively account for 20% of its forest area (on average approximately 43.5 hectares per village; 0.06 hectares per capita). The local economy and livelihood of the tribal people and non-tribal people living in southern well-forested region of Rajasthan, is dependent on agriculture, livestock rearing, horticulture and occasional (seasonal) migration to urban areas for unskilled labour work (Vyas, 2008).

Non-timber Forest Products provide income for poor households especially during droughts and years of poor harvest in Rajasthan. Vyas (2008) suggests that there is a strong dependency on the forests by many of the poor living around the forest. For example, both Laxmi et al. (2003) and Robbins et al. (2009) document the dependence of rural people on the forest for fuel wood. Forests not only meet fuel wood and fodder needs of the people and livestock, but also contribute Rupees 7,160 million (\$14.09 million CAD) to the state domestic product.

2.4 Baran District

Baran District has a geographical area of 6,992 km² with a forest cover of 1,089 km² (Figure 2.1) (Forest Survey of India, 2009). The forest cover includes 149 moderate dense forests (lands having tree cover with canopy density between 40% and 70%) and 940 open forests (lands having tree cover with canopy density between 10% and 40%) (Forest Survey of India, 2009). Baran has eight tehsils², Shahabad being one of them. Shahabad Tehsil has a total of 236 villages including Khanda Sharol (Sharma, 2005).

2.5 Khanda Sharol Village

Khanda Sharol Village in the Baran District is located at 25° 09' N latitude and 77 ° 06' E longitudes (Figure 2.2 -Satellite image). This village is in close proximity (a radius of ten kilometers) to six other villages (Ghesua, Kaloni, Bichi, Mamoni, Indira colony and Dhikwani) in the Baran District. The village has 365 households with a total population of 1,983. Khanda Sharol Village has two elementary schools (Grade 1-7) and one high school, one health centre and an 'Angan wadi' (government run wellness centre which provides nutritious food packets to children and pregnant women). One elementary school is exclusively for the Scheduled Tribe children. To understand the village composition of the different castes present, it is important to understand a little bit about the background of the caste system in India.

2.5.1 Background information on Indian Caste System

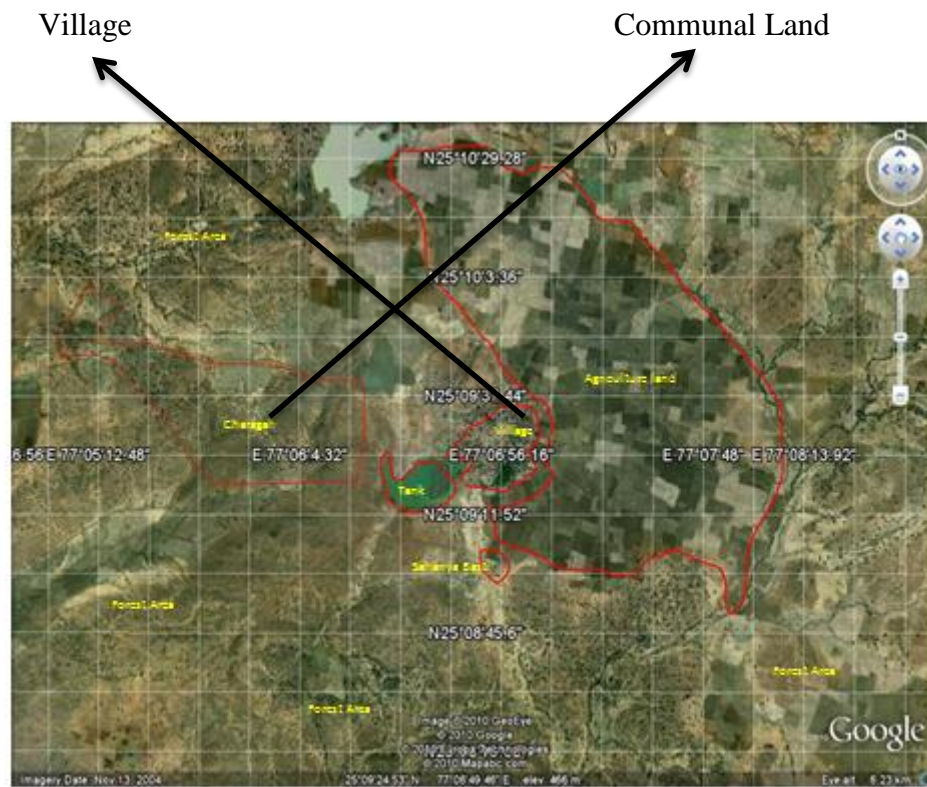
The nomadic people of India called the Indo Aryans were divided into four castes or social categories. The divisions were based on inherent qualities or career potentials of each individual.

The four castes were (Bhaskarananda, 1998):

- 1) Brahmin or priestly caste (learned people who could give moral and spiritual guidance; example, priests and teachers)
- 2) Kshatriyas or military caste (people capable of martial qualities; example, warriors, kings and administrators).
- 3) Vaisyas or merchants caste (people gifted with business shrewdness; example, merchants)
- 4) Shudras (all others belonged to this caste; example, farmers, artisans, labourers, and others).

² The term 'Tehsil' is similar to a county. It is a unit of government which consists of one or more towns with surrounding villages.

Over centuries, the Aryan society experienced considerable change under various rulers, including the Greeks, Huns, Arabs, Turks, Afghans, Persians, Mongols (Mughals), Portuguese, French and British (Bhaskarananda, 1998). Muslim rulers, from Muhammad of Ghor to the Mughals such as Babur, Humayun, Akbar, Jahangir, Shah Jahan and Aurangzeb, ruled over portions of India for over 600 years. By the end of 18th century, the British assumed power; however British government relinquished its hold on the subcontinent in 1947 when India gained its independence (Majumdar, 1960).



(Source: Satellite image provided by BAIF staff Hari Panchal)

Figure 2.2 Study Site

After gaining independence, the Indian administrators realized that certain communities were suffering from extreme social, educational and economic hardships arising from the caste system. They also noted that some other rural communities were being marginalized due to limited economic opportunities, lack of infrastructure facilities, and geographical isolation. These populations were then labelled as Scheduled Castes (SC) and Scheduled Tribes (ST) to

safeguard their interests and to accelerate their socio-economic development as written in Articles 341 and 342 of the Indian Constitution (Government of India, 2005). Later on another caste called Other Backward Class (OBC) was added in 1993 (Government of India, 1993). As per the Constitution, Scheduled Tribes are people who (or whose ancestors) were tribal people living in the forest and were seen as having no formal occupation due to residential isolation, and Scheduled Castes were the so called “untouchables” – for example those who cleaned washrooms, performed burial duties, or processed animal skins. Other Backward Class were people who mainly depended on agriculture, were labourers and did not have a strong resource base; it also included artisans, weavers, potters, and blacksmiths (Government of India, 1993).

2.5.2 Present Demographics

Khanda Sharol has a total population of 1,983 people including 576 men, 553 women and 854 children under the age of 18 (see Table 2.2). Among the four communities of people in the village ST members are considered as the lowest in the group, the second are the SCs, then OBC. Others are non-Hindus in the community and do not belong to a caste; they represent 0.65% of the village’s population and rank the highest in the social and economic hierarchy.

Table 2.2.Village Population

Caste	Population				Totals
	Men	Women	Children (age)		
			0-5	6-18	
1 ST	106	112	71	117	406
2 SC	203	195	111	224	733
3 OBC	262	242	116	211	831
4 Others(non-Hindus)	5	4	1	3	13
Totals	576	553	299	555	1983

(Survey Data 2010)

Village homes are constructed with either brick or mud. In the past, Government authorities provided brick homes for the Scheduled Tribe members in the village, but even today many continue to reside in one room mud houses.

2.5.3 The Sahariya Tribe

The name Sahariya is said to be derived from the Arabian word 'Sehara' or 'wilderness' (National Informatics Centre, 2011). The above-mentioned Muslim rulers (see Section 2.5.1)

found the Sahariya tribes people residing in the jungle, and reportedly gave them their present name 'Sahr' which means 'Jungle' and accordingly they came to be called 'Sahariya' meaning residents of the jungle (Sharma, 2005). Sahariyas are believed to be the first settlers in Rajasthan; hence the Rajasthan Government has declared this area as the Sahariya region (Government of Rajasthan, 2002) Residing in communities with non-Sahariya members, the Sahariyas mostly live in a separate area in the village which is called 'Saharana'. In villages, ties to the caste system are very strong and people belonging to the same caste live in close proximity (field notes, 2010). Sahariya tribes practice Hinduism as their religion and speak a dialect influenced by Hadoti (a dialect of Rajasthani language) (Survey Results 2010).

In a recent study, Sharma (2005) found that 90% of the Sahariya tribe were labourers, 4% owned land, and 6% had other jobs (e.g. a security guard, other government job). Men, women and children serve as agricultural labourers for landlords or money lenders. Although the Government of India had fixed a sum of 78 Rupees (Rs.) per day as minimum wage for Sahariya labourers to improve their economic condition, they are often paid as little as Rs. 50 per day as there is no means of enforcement (Sharma, 2005). Consequently multiple members of a family, including children, work to meet the most basic of household needs. When a Sahariya is sick or is unable to work on a given day it is not uncommon for double the amount of his daily wage to be deducted from his pay (Sharma, 2005). These conditions limit any opportunity to save income, most often forcing a majority (70%) of all Sahariya households into debt (Sharma, 2005). To get rid of these debts they have to work as an indentured labour for the remainder of their lives and in some cases the debt of a passing parent will be transferred to their surviving children. My study examines in particular the livelihoods of the Sahariya tribe – the Scheduled Tribes and Scheduled Castes (Untouchables) among other residents of Khanda Sharol village. The next chapter presents the literature review relevant to this study.

Chapter 3

Literature Review

3.1 Introduction

This chapter analyses some of the critical literature in the general area of social forestry (e.g., Haeuber 1993a; Seeland & Schmithusen, 2000; Vyas, 2008). This literature review identifies the issues related to the contribution of NTFPs to the livelihood of forest dwelling peoples, such as the conflicts and struggles of tribal people in India; in addition to some of the changes that have taken place in forest cover in India. As a final point, this chapter will also relay the effects of programs started by the Government of India, like Joint Forest Management (JFM).

Forests represent an abundance of life by providing a habitat for many forms of plants and animals (Schmithusen, 2000) and at the same time are places of conflict affecting plant life and the well-being of forest dwelling people (Doornbos, et al., 2000). The increasing population growth in some parts of the world is creating considerable pressure on the availability of natural resources, especially in developing countries such as India (Haeuber, 1993b). This places the tribal people in a very tenuous position given that "... even today forests play a very significant role in tribal economies" (Kant, 2000, p. 249).

3.2 Forestry in India

Forests in India have played an integral role in sustaining people over many millennia. The recorded history of India shows evidence that forests not only provide nutritional, medicinal and subsistence goods but also provide the environment of spiritual and cultural expression (Das, 2000). Rural populations have always used unprocessed bio-fuels like fuel wood, crop residues and animal dung for energy (for cooking and heat in winter) (Laxmi et al. 2003). The 250 tribal communities of India make up 7.8% of India's population (Kant, 2000). For many tribal communities forests represent God (Jena, 2000), a way of life (Das, 2000), a culture (Tejaswi, 2008) a home (Kant, 2000) and a source of income (Kant, 2000; Tejaswi, 2008). Forests and the resources found therein serve as 'safety-nets' in times of extreme adversity like famines and droughts (Vyas, 2008). However, the tribal life that totally depended on forests has been disturbed due to deforestation (Kant, 2000). Of particular importance in this context is the place of tribal women who are perhaps most dependent on the forest, as they are largely the ones responsible for fuel wood collection, bringing water, and gathering other means of support from

the forest, along with the responsibilities of cooking and cleaning (Laxmi et al., 2003; Negi, 2001).

Deforestation is the legacy of colonialism (Haeuber, 1993b). Forest loss had reached a precarious point by the time India gained independence in 1947; however, it is important to examine India's pre- and post-independence economic development path to get a better understanding of the course of India's deforestation.

In the British era, forests were bound by the requirements of the colonial state (Haeuber, 1993a). As noted in Haeuber (1993a) the first massive deforestation happened in the late eighteenth and early nineteenth century when the British Empire established itself in India; this was largely because timber resources of the British Isles had been exhausted and Great Britain needed timber to build ships to maintain its global supremacy. Also, the British government began emphasizing agricultural production in rural India which also required deforestation (Stebbing, 1982).

Unfortunately, India's independence from Britain made little difference in forest policy. In the aftermath of independence, the federal government transferred authority over forests to state governments. However, the continued need for economic growth within the states led to the forests continuing to be cleared and used for agricultural production (Haeuber, 1993b); this led to significant changes in forest cover, which is discussed below.

3.2.1 Change of Forest Cover

The literature pertaining to forest cover provides conflicting results. For example, Gulati and Sharma (undated) draw from other studies to state that the forest cover in India declined by over 40% between 1951 and 1997. As noted in the Forest Survey of India (1997, p. 12), "the forest resources of the country have been under mounting pressure owing to increasing human and livestock population. Excessive withdrawals are much beyond the carrying capacity, and are no more sustainable. This has resulted in depletion, degradation and endangering natural regeneration of the forests which has become a cause of serious concern."

Bi-annual reports published by the Government of India appear to indicate little change in forest cover between 1987 and 2009. However, these reports are somewhat difficult to compare due to differences in reporting; for example, some reports show recorded forest cover

whereas some show actual forest cover with a breakdown based on the types of forests. These differences in reporting may be due to improvements in measurement techniques (Government of India; Roy 2006). DeFries and Pandey (2010, p. 136) confirm this observation when they state that "... spatially explicit data on changes in forest cover at the district and state level are limited due to incomparable resolutions and methodological inconsistencies." Consequently, it is difficult to make conclusive statements about precise changes in forest cover especially over the last two decades. However, these reports suggest that forest cover has decreased on a per capita basis; this is largely due to the population growth rate being higher than the growth in forest cover (Gulati & Sharma, Undated).

3.3 Non-timber Forest Products

It is estimated that 30 million forest dwellers, mostly of tribal ancestry, depend on Non-timber Forest Products (NTFP) for their livelihood in Central India (Quang, 2006). Non-timber Forest Products can be defined as "all biological materials, other than timber, which are extracted from forests for human use" (Belcher, 2003, p. 161), NTFPs include medicinal plants, mushrooms, fruits, resins, bark, roots and tubers, leaves, flowers, seeds, honey etc. NTFPs can be "[a]ny commodity obtained from the forest that does not necessitate harvesting trees, including bush meat, fur-bearing animals and the gathering of deadfall fuel wood" (BC Ministry of Forests and Range, 2008). Hegde (2005) also highlights the importance of NTFPs for the purposes of food security; wood and biomass; medicines and plant protection; as well as aromatics, dyes and oilseeds.

Research highlights the interdependence between farm and forest in rural environments and shows the growing demand for forest resources. Kant (2000) summarizes the findings of several research projects that document the important contribution of forest resources, including NTFP, to tribal income. According to Tejaswi (2008), NTFP are considered crucial for the sustenance of rural livelihood; reduction of rural poverty; conservation of biodiversity; and the advancement of rural economic growth. Growing local, national, and international markets involve NTFPs (Wilkinson & Elivitch, 2000) where the collection of honey, edible gums, various leaves and fruits are sold in markets to provide cash income (Forest Survey of India, 1987). According to Vyas (2008), the total contribution of NTFPs through tendu leaves, bamboo,

fruits, barks, roots, medicinal, tubers etc., works out to approximately Rs. 520 million annually through recorded and unrecorded revenues.

Clark (2001) suggests that NTFP should be considered a ‘magic bullet’ to solve the problems of deforestation. He also states that NTFP are important, everlasting, and a fundamental part of tribal culture, and must be considered in forest management decisions. Cultivating trees for NTFPs also helps in achieving environmental objectives such as the conservation of watersheds, biological diversity, and genetic resources (Tejaswi, 2008). An estimated 80% of the population of the developing world use NWFP³ (Non-Wood Forest Product) to meet some of their health and nutritional needs (FAO, 2008).

Studies in India show that the forest dependent populations, who lack access to agriculture based income prospects, rely heavily on NTFP for survival (Chandrashekaran, 1994); moreover, the tribal regions include approximately 70% of India’s NTFP collection (Sharma, 2005). In India, over 50% of the population resides in rural areas, most of who are to some degree dependent upon NTFPs for survival (Sawhney & Engel, 2003). Tribal people and forests have a long history together (Vyas, 2008); these people have depended on forest for economic, social and cultural needs (Tejaswi, 2008).

The tribal peoples of India derive considerable value from NTFP. They depend on the forest to provide domestic energy (fuel wood) and home construction materials. The forest also provides medicinal plants that are not only effective at treating a range of ailments, but are also sacred to tribal culture and heritage (Jena, 2000). For many tribal peoples, NTFPs provide remedies to several common illnesses. The science of Ayurveda (Science of Longevity), or alternative medicine, was discovered in India, and uses herbs for the treatment of many ailments (Mukundcharandas, 2005). In India, nearly 15%–20% of the Ayurvedic medicines are based on animal-derived substances.

Studies done on the Sahariya tribe provide information regarding the use of animals and their products in folk medicine (Mahawar & Jaroli, 2007). Researchers recorded a total of 15

³ The term NWFP excludes all woody materials. It includes products used as food and food additives (edible nuts, mushrooms, fruits, herbs, spices and condiments, aromatic plants, game), fibres (used in construction, furniture, clothing or utensils), resins, gums and plant and animal products used for medicinal, cosmetic or cultural purposes. NTFPs, by contrast, generally include fuel wood and small wood use; this is the main difference between NWFPs and NTFPs (FAO 2008).

animal species were being used for different ethno-medical purposes by the people for different ailments, including cough, asthma, tuberculosis, paralysis, earache, herpes, weakness, muscular pain etc. Domestic animals and some protected species like the peacock (*Pavo cristatus*), hard shelled turtle (*Kachuga tentoria*), and sambhar (*Cervus unicolor*) are also used as medicinal resources (Mahawar & Jaroli, 2007). Mahawar and Jaroli's research illustrates how forest and forests resources are used in many ways in India. Yet another study in Rajasthan concludes that traditional practitioners of Rajasthan recognize and use various medicinal plant species and these species are being seen as potential candidates for development of new drugs (Upadhyay, Praveen, Dhaker, & Kumar, 2010). Preservation of NTFP is therefore essential to maintaining and continuing traditional ways of life and essential for satisfying social, cultural and emotional needs.

3.3.1 Commercial Value of NTFPs

Literature shows that 20% to 30% of the rural labour force gets 50% of its income from NTFP small scale industries based on NTFP (Tejaswi, 2008). Moreover NTFP provides employment to approximately 55% of the people in the forestry sector (Joshi, 2003). For example, *tendu leaf*⁴ collection provided 90 days of employment to about 7.5 million people every year in India (Mistry, 1992). The income earned by NTFP helps many rural households in India sustain their families by providing supplemental income to ensure household security (Olawoye, 1996). According to Vyas (2008, p.4), "The total contribution of forestry in the state (Rajasthan), in the form of recorded and unrecorded withdrawals, works out to Rs. 7,160 million (Rs. 716 crores or \$159 million). Empirical analysis shows that nearly 60 million -- "man days"-- are generated in the primary sector for harvesting these forest products."

Around the world, it is estimated that the total value of world trade in NTFP is approximately \$1,100 million USD (Tejaswi, 2008), including an annual NTFP production value of \$241 million in Canada (Saskatchewan Environmental Society, 2002). Research by Sunderland *et al.* (1999) confirms that NTFPs provide sources of food, medicines, and income to many households in Central Africa. Pervez (2002), in a study of the NTFP segment in Dhading

⁴ Tendu (Kendu) (*Diospyros melonoxylon*) leaves are valuable leaves used for wrapping Bidis (local cigarettes), popular especially among poor natives.

district of Nepal, observed that NTFPs generated the maximum employment (60.72%) among NTFPs, agriculture and other allied activities.

3.4 Joint Forest Management Program

Recognizing the level of dependence that tribal members have on the forest, together with the practicalities of managing forested areas over such a large geographical expanse (Sundar, 2000), India, in 1970, introduced Joint Forest Management (JFM) programs across the country. JFM is a partnership between forest departments and rural users of forest resources to restore deteriorating forest land (Balooni, 2002). In return for protection of the forest by rural people, the forest departments of the state governments agreed to share the benefits from such as sharing a portion of the revenue from commercial harvesting (Sundar, 2000). Although criticised for lacking legal standing; insecure tenure arrangement (Kashwan, 2003); absence of legislation (Upadhyay, 1997); and unclear norms regarding benefit sharing (Kashwan, 2003), the JFM program has had success in engaging forest users in the management process in ways that have led to more sustainable and equitable management (Balooni, 2002). That said, there have been challenges in the program, foremost being instances of illicit forest use. In a recent study, Robbins et al. (2009) concluded that illegal forest use is a threat to the remaining forest areas of India. They further suggest that the combination of illegal forest use, together with population growth in rural areas, puts at risk the sustainability of India's remaining forest cover (Robbins et al., 2009). Thus, despite the introduction of JFM programs, many of India's forested areas are treated as commons which, as Hardin (1968, p. 1244) notes, can bring ruin to all. Sunil Ray (2008), in his research on resource management in Rajasthan, studied the impact of an institutional approach in resolving environmental crises. One powerful way of understanding environmental issues, such as deforestation, is to examine the changing structure of communities in the area (Moran, 2005). To understand communities it is crucial to assess the different social dimensions present in the community such as social hierarchy, dynamics of the people, power, and gender relations (Ray, 2008).

3.5 Research Gap

Previous research in literature mostly portrays the relationship of man and forests. Das (2000) describes the relationship of man and forest in an ethno-historical perspective, and implies the dependency of man over forests. In their studies, Kant (2000), Hegde (2005) and Tejaswi (2008)

relay the importance of NTFP as contributors to tribal income. Although not stated directly, these studies imply that any decline in NTFP collection will negatively impact income. Hegde (2005) expounds the potential role of organisations like BAIF in sustaining the collection of NTFPs. Although researchers have documented the importance of NTFPs for the livelihoods of the rural population there is limited research on the potential impact of deforestation as it pertains to the availability of NTFPs to support the livelihoods of the tribal people. None of these studies have examined the impact of the decline of forests; the NTFP collection patterns; or the impact of NTFP collection on the livelihood of tribal people. To the best of my knowledge, there have been no previous studies that explore these dynamics. It is also noteworthy that previous research studies examining changes in forest cover do not seem to provide conclusive evidence on the topic; due to the lack of availability of satellite images, and variances in measurement and reporting. Accordingly, there is opportunity to carry out further research to get a better understanding of changes in forest cover. This present study attempts to fill this gap by collecting data on NTFP collection patterns, to get a better understanding of the potential impact of changes in forest cover on the sources of revenue for tribal people.

Finally, there is little research on the management and outcomes of joint forest management programs which are considered important for tribal people to derive benefits from the forests. This present study attempts to address this issue through getting a better understanding of the demographics of the tribal population as suggested by Moran (2005) and Ray (2008). Knowing such details enables NGOs like BAIF to develop more appropriate interventions to help the members of the village to be self-reliant in the future. Moreover, the collection of current demographic information will also help to identify other regions with similar attributes; thus these comparisons may help NGOs like BAIF to set up developmental projects in additional regions. The development of communal land in the Baran District is being acknowledged as a pilot project for the Khanda Sharol tribal region; hence having an account of the present demographics will be helpful for comparative studies in future and also for replicating this model of development in other regions around the globe.

Chapter Four **Research Methods**

4.1 Introduction

This chapter presents the methods used during the course of this research as well as the ethical principles that guided the research process. As this a descriptive study, involving historical as well as contemporary data, a range of research methods was employed. For this study, members of the village were asked to narrate their experiences with regards to change in forest cover and collection of NTFPs from their living memory.

4.2 Project Funding

Funding for this research was provided by International Development Research Centre (IDRC) and the Canadian International Developmental Agency (CIDA). CIDA funding came in the form of a paid internship that I undertook with BAIF. Under the program theme of *Increasing Food Security*, CIDA funding provided travel and living support while in the field. In advance of my research (August 2010) CIDA organised a pre-departure orientation on Intercultural Effectiveness to help prepare interns for living and working abroad and to familiarize interns with the cultural settings of their intended destinations. Although I lived in India from my birth until 1988, this program nonetheless proved helpful in preparing me to think about bridging cultural tendencies and the challenges of engaging in effective cross-cultural communication and research.

4.3 Preliminary Field Visit

Prior to initiating my fieldwork, I had the opportunity to meet with BAIF staff in New Delhi (May 6, 2010) and to travel to Khanda Sharol village to visit tribal members and the BAIF staff working in the area. I travelled to Kota, and met with the BAIF staff and the village residents on May 10th, 2010. The village was about 135 kilometers from Kota, which equates to a three-hour drive. An introductory meeting was arranged by the BAIF staff so that I could meet with village members present, and discuss the general objectives for the community project. Packed lunches (an accustomed monthly activity of BAIF staff) were prepared and shared with the village members who attended this first meeting. During this time, the group discussed the changes that

they have seen on the land and what they would like to see done through the research. Being able to converse in Hindi helped me considerably in building rapport with village members. After spending the day touring the village and visiting local residents my research was approved, and I was invited back to Khanda Sharol to carry out my research in September of 2010.

4.4 Collaborative Proposal Development

BAIF had agreed to host my internship and have me work as an intern for the CIDA project. Maintaining the theme of CIDA requirement of increasing food security, with the three underlying aspects of: sustainable agricultural development; food assistance and nutrition; and research and innovation, it was important to develop a proposal that was inclusive of these areas of sustainability. The initial objective of the research was to study the change in forest cover and collection patterns in non-timber forest products. Saskatchewan Research Council (SRC), in collaboration with BAIF Development Research Foundation, was in the process of developing a proposal for production of sustainable NTFP and value chain management through model forest concept and agroforestry practices. Through meetings with SRC, University of Saskatchewan and BAIF it was concluded that in order to develop the above mentioned proposal it was important to first have a production system of NTFPs in place on the communal land acquired by BAIF. Therefore, it was important to understand the historical and contemporary use of NTFPs and also study its impact on the livelihoods of people living in the area. Hence, my master's thesis started with the objective of studying the present and traditional patterns of NTFP collection and the impact of the change on the livelihood of the population in that region. The CIDA internship assisted in providing for the collection of a base line data of the people living in the village; which included family description, NTFP collection processes, income generation and spending patterns of households in the region.

4.5 Field Research

After my initial visit in May 2010, I returned to Saskatoon to complete my research ethics application and await approval before returning to the field. Because the predominant language of village residents is Hindi (National Language of India), all consent forms, surveys and other required release forms were translated into Hindi. After receiving my Ethics Approval (BEH#1-204) I returned to India on September 14, 2010, to begin my research and to start my internship

with BAIF. As part of my internship I was asked by BAIF to compile a detailed report on the socio-economic standing of all the 365 households in the village. A household survey was designed (Appendix 1) that would capture various demographic parameters, including household family structure, land ownership, employment patterns, and the historical and contemporary use of NTFP. Table 4.1 provides a description of survey content.

Table 4.1. Household Survey Themes

1. Family description and caste	Number of people living in the house including children under five and children between 6 and 18 years and adult men and women. They were also asked to identify their caste in the community
2. Family structure	Maintained a Joint or nuclear family structure
3. Literacy Level	Number of males and females literate at home
4. Annual Income	Income earned from all occupations- agriculture, labourer or other
5. Land ownership	What kind of land they owned-irrigated, rain fed or fallow, leased or were land less
6. Crop information	If their occupation was agriculture what crops they grew
7. Livestock population	If they owned any kind of livestock-cow, ox, goat, hen, or anything else
8. Migration patterns	Did they migrate to find jobs, how much did they earn during that period and season did they chose do migrate
9. NTFP collection patterns	NTFP collection patterns in the past and present. Reasons for change if any
10. Food consumption patterns	Information on what fruits, vegetables, cereals, tubers and grains where bought from the market, where grown at home and what was brought from the forest
11. Expense patterns	Main categories where money was spent like food, education, health, social expenses, recreation, asset building and agriculture

There were 365 households in the village. Harvesting season had started when I arrived in mid-September after the rainy season; all men and women were busy working in the fields harvesting their own crops or working as labourers in others' fields. Hence we visited the village

in the evenings and early mornings to get the survey completed. I stayed as a paying guest at one of the BAIF staff's residence, about 75 km from the village. Having the survey forms in Hindi helped in building trust with the members of the village. I also promised the villagers that their names would not be revealed to others.

BAIF staff working in the area accompanied me to complete the surveys. To establish a routine method of gathering data from the community, we first asked for the householder's consent to participate in the above survey. The survey questions were asked only of the head of the house, either the man or woman; each survey took about 20-30 minutes to complete. No monetary compensation was given to the participant of the survey. Only very few household members did not understand Hindi. In the few cases where language was an issue, BAIF staff administered the questionnaire survey by translating it to the Hadoti language. Questionnaires were completed in two phases; 164 were completed during my first field visit in September and in the second phase 201 questionnaires were completed in November and December.

4.5.1 Interviews

Key informant interviews were conducted with 17 residents; 9 out of 17 interviewees were members of the committee formed by BAIF for managing the communal land and the remaining 8 were individuals available during our visits to the village. Although these interviews were meant to be one-on-one, this was not possible. Village members were always in groups and facilities to take individuals and conduct one-on-one interviews were not available. They answered in groups and precautions were taken to ensure that there was consensus in what was being said. Interviews were conducted in Hindi and focused on several key areas, foremost being historical and contemporary uses of NTFPs and changes in forest cover over time. Women were queried about fuel wood collection in regards to distance and safety issues. Two BAIF staff accompanied me during the interviews. My collaboration with BAIF staff also allowed for additional information to be gained. These informal discussions with BAIF staff proved invaluable for enhancing my understanding of the challenges faced by the Sahariya tribal members.

The festival month in India starts in mid-October. Knowing that little work could be conducted during this time, I returned to Canada to reflect on the research that had been conducted to date, and to meet with graduate committee members. This brief hiatus from the

field proved to be an excellent opportunity to identify new or remaining questions that needed to be explored upon my return in November. Upon studying the surveys that were completed during the first phase, I realized that greater emphasis needed to be directed to household use of NTFP collection. Upon my return in November, I conducted additional interviews and focus groups to gather NTFP collection patterns, both historically and at the present time. A copy of the interview questions is attached in Appendix 2.

4.5.2 Focus Groups

Six focus group interviews were conducted, of which, one group consisted entirely of males, another one was an all-female group, and the remaining were mixed gender groups. The focus group participants belonged to different castes and included village elders and senior members (adults over 50 years). Information regarding change in forest cover over time and its impact on NTFP were the main items of the focus group interviews. The women's group was probed more with questions related to fuel wood collection. Focus groups were mostly conducted in individual households. No monetary compensation was provided for any of the focus group participants.

4.5.3 Participant Observation

Participant observation was not the principal research strategy used for this study of the Sahariya, utilizing NTFP with respect to their livelihood. During my initial visit in May, I had thought of staying in the village, but during my subsequent visits I realized that would not be possible. Village members mostly lived in one-room houses which could not accommodate visiting researchers. As such, I chose to stay in Baran, in the home of a BAIF staff member. Although not ideal, this accommodation arrangement did allow for relatively easy travel to and from Khanda Sharol without being a burden to village residents. During the days spent in the village, I visited the school. Children sang their morning prayers for me and the principal showed me around the school. Midday meals were provided to children every day. I distributed some colouring books and pencils to the children which I had taken with me. Village members offered vegetables grown in their gardens. They showed me their kitchen gardens and their one-room houses. Although I had planned to go with the women of the village to collect fuel wood, due to weather constraints, I could not attend this activity.

During my visits to the village, I visited the communal land area established by BAIF for the village members. BAIF staff took me on a tour of the land and showed me the different species of trees and plants that had been planted by the village members. BAIF hired village members as labourers to work on the land and paid them. On one of the payment days I accompanied BAIF staff and had the opportunity to talk with all of the women. I held the women's group focus interview at that time. They were very curious to know what I did, other than research, and I shared with them the daily routines of my personal life.

4.6 Data Analysis

An excel spread sheet was designed to present the data as a whole. All parameters were coded so that they could be properly assigned on the spreadsheet. Various sums, averages and ranges of income have been considered for assessment. Individual and focus group interviews were translated into English for analysis. Members in their interview mentioned a number of NTFP that they collected from the forests. BAIF staff helped to collect information concerning household's fuel wood consumption which was included in the data set.

4.7 Ethical Considerations

As this research was conducted in the tribal area of Rajasthan, some special considerations were made in terms of research ethics. Most of the women were illiterate or had very little formal education. Because of this, I made sure that I explained in great detail my role as a researcher, the purpose of this study, and how the data collected would be used in the future. I clarified that their involvement in this study was completely voluntary. I also assured the women and men that I did not work for any government or BAIF but rather, was a student from Canada, who was there to learn more about them, and the changes they are experiencing in relation to the forest. After they understood my intentions, I gained informed consent before proceeding with my inquiries.

According to the ethics guidelines at the University of Saskatchewan, "At the University of Saskatchewan, the purpose of ethics review of research involving human subjects is (a) protection of the research subjects, (b) protection of the academic staff, support staff and students of the University of Saskatchewan, (c) the education of those involved in research, and (d) preservation of the confidence and privilege that the public bestows on the higher education community to conduct research involving human subjects. Where human subjects are used in the

course of research or other comparable activities, it is the primary concern of the University that the rights of the subjects be respected and protected and that the procedures followed are ethically, medically, and legally correct” (<http://www.usask.ca/research/>). Following the policy and procedures of the university’s ethical code stipulations, the ethical implications that pertained to this study were greatly considered, as human beings were the main subjects for several parts of the data collection. The areas of ethical consideration were the interview subjects and participants in the focus group.

The BAIF staff members have been working in the area since April, 2006. The people of Khanda Sharol trusted the BAIF staff integrally; hence, it was easy for the community to trust me, as I was accompanied by the BAIF staff members. My knowledge of the Hindi language gained me further familiarity with the villagers; as the languages that are spoken in this area of Rajasthan are Hindi and Marwadi (very similar to Hindi). Moreover, I have grown up in the northern part of India, which made it easier to understand the culture of this area. During my initial visit to the research area in May 2010, I discovered that I had no problem in having a conversation with the tribal people of Khanda Sharol, since I could speak and understand their language; I was able to establish trust and rapport with them.

4.8 Dissemination

CIDA’s requirement for the internship was to give a public presentation of the work I had done in India. After returning from the field in December 2010, I presented my preliminary findings during a scheduled seminar at the University of Saskatchewan on January 29th, 2011. This seminar is also a program requirement in the SENS program. In addition, CIDA arranged for a ‘debriefing’ session in Toronto for all program interns. The debriefing workshop took place in February 2011 and gave me an additional opportunity to reflect on my personal experiences with others who had also returned recently from the field. Although I had grown up in India, this internship experience introduced me to many new and exciting experiences, foremost being the opportunity to spend time in India’s tribal region and get a glimpse of the daily lives of tribal people. In many respects it was an eye-opening and life-changing experience for me. This experience also solidified my commitment to furthering my education so that I can be in a better position to assist those who welcomed me into their homes and shared with me what little they have.

As part of the dissemination process, I will provide all original survey forms to BAIF along with raw and organized data in an Excel format. I will also share copies of all photographs taken during fieldwork along with signed consent forms. All written material deemed appropriate by BAIF for public dissemination will be made available through the BAIF website <http://www.baif.org/>.

On 5th April, 2011 a presentation was made to BAIF officials Mr. Ramesh Rawal (Senior Vice President) and Mr. Bharat Kakade (Vice President Technical) during their visit to Saskatoon. Following the presentation, plans were made for a return visit to share the result with village residents and to begin preparation for the new research stemming from this project. I plan to make an album of the photographs I took during my visits to the village and add the results chapter after translating it into Hindi, so that I can give a copy to BAIF and a copy to the village Sarpanch (elected head of the village government body, the Gram Panchayat).

4.9 Conclusion

As stated above, this research is a descriptive study which presents the ‘lay of the land’ as it currently exists. The data can be used in the future for a longitudinal study to examine changes in the livelihood of the members of Khanda Sharol village when the communal land is in full production. The next chapter presents the results of the current study.

Chapter 5

Land Cover Changes and Access of NTFPs

5.1 Introduction

This chapter presents the results of my research with respect to changes in the land cover and the resulting access of NTFPs. This includes the identification of NTFPs that were used historically by tribal members as well as those NTFPs that continue to be utilized by village residents at the time of this research (2010). In addition to identifying the historical and contemporary uses of NTFPs, this chapter also explores some of the social and ecological changes that were noted by tribal members to have affected their use of NTFPs over time.

5.2 Historical Use of NTFP

NTFP have been collected by tribal members for countless generations. For this research, the historical perspective dates to a period of living memory of the senior members of the village ranging in age from 20 to 70 years. All the senior members of each of the focus group were queried about their historical use of NTFP.

As noted in Chapter 2, the population of Khanda Sharol (1,983 residents in 365 households) is organized into four caste groups - Scheduled Tribe (ST), Scheduled Caste (SC), Other Backward Class (OBC) and Others (Non-Hindus). The 365 households included 81 Scheduled Caste families, 136 Scheduled Tribe families, 146 Other Backward Class and two families from Other category. Two families from Other category were Non-Hindus and were excluded from further analysis. Historically the ST, SC and some of the OBC households derived their livelihood solely from the forest, collecting a number of products for personal use as well as to sell in the markets, village fairs, and festivals or to middlemen who would periodically come to the village to buy NTFP for resale.

Based on 365 completed household surveys, together with focus group interviews, a range of NTFPs were identified as being used traditionally by tribal members. These included Chironji or achaar, mahua, edible gum, honey, shellac (wax), awala and tendu leaves. Also collected were seasonal fruits (including ber, kaitha, gilondi and vegetables such as kakora karela, and dudhi. Table 5.1 shows the products that were brought from the forest for consumption as well as for selling in the market. According to the village members achaar,

mahua, and tendu leaves were the three primary NTFPs sold in the market. Achaar, being a dry fruit, garnered the highest market value (Rs.35-40 per kg).

Table 5.1. Collection of NTFPs for Consumption and Market in the Past (Number of households and percentage of households)

NTFP	Caste 1 ST		Caste 2 SC		Caste 3 OBC	
	N	N%	N	N%	N	N%
0. Data Not Available*	4	4.9%	44	32.4%	18	12.3%
1. Mahua (Fruit)	75	92.6%	69	50.7%	118	80.8%
2. Achaar (dry fruit)	61	75.3%	45	33.1%	115	78.8%
3. Tendu Patta (leaves)	73	90.1%	64	47.1%	124	84.9%
4. Fuel wood	64	79.0%	63	46.3%	125	85.6%
5. Goond (Gum)	17	21.0%	18	13.2%	2	1.4%
6. Vegetables in the wild	24	29.6%	20	14.7%	16	11.0%
7. Awala (herb)	3	3.7%	8	5.9%	1	0.7%

Legends: *- Household that did not report, N –Number of households, N% - Percentage of households collecting each NTFP from the forest. (Survey Data 2010)

Considered to be ‘forest dwellers’, members of the ST gathered the greatest amount of NTFP for both household use and market distribution as seen in Table 5.1. Members of the Scheduled Tribe (ST), or ‘Adivasis’ belong to the lowest caste and were the most dependent on the forest for securing their livelihoods (Government of India, 1993). As one woman from a higher caste (OBC) made it clear that she did not go to the forest to bring wood or other products. In her words: “Adivasis (tribal people) go to forest” (Committee member).

During the focus group interview with some ST members, one individual noted as follows:

We used to bring goond (edible gum), lac (shellac), honey, tendu leaves, mahua, achaar, and wax for candles. We used to get quintals (100 kilograms) of these products. We could survive for almost a whole year by selling the products to businessmen.

Other ST focus group participants commented as follows:

We never farmed, we survived on forests. We used to get produce equivalent to farming products of four to five bheega (1 to 1.4 hectare) of land from the forest. We went in the morning and each household was able to bring 2 mun (Maund, one mun or maund is equal to 40 kg) of each achaar, mahua, tendu, and goond and sell them in the market; we were able to survive all year round. I never

cultivated anything. I was able to live comfortably on collecting and selling forest products (committee member).

Other tribal elders from the only OBC focus group concurred, adding:

We used to bring tendu, mahua, achar, goond, very little lac, gilondi. All year round we were able to get something or the other and were able to survive. We used to bring things to make cooking oil which was very healthy-Tilly and gillu ka tel. Forest products gave us enough that we could survive for six months and rest of the time we farmed. Ninety percent of the people went to forest and used to bring all the products to sell them at the fair or to businessmen in the village. Now those businessmen have taken up different jobs. Not only our village but the entire district brought products from the forest and survived on it.

In some cases, tribal members would relocate for short periods of seasonal employment but would rely on the gathering of NTFP to sustain them during the remainder of the year. During the women's focus group stories were shared of how they used to bring mahua, goond, achar, tendu from the forest by cart. Focus group members sadly noted that now there is nothing left to be brought from the forest.

5.3 Contemporary Use of NTFP

Based on survey results and focus group interviews, Table 5.2 identifies the NTFP that are currently gathered by tribal members from the forest. Fuel wood and some vegetables including kakora, karela, and dudhi are the only NTFP that are brought from the forest. Historically 50% to 90% of households brought mahua from the forests and now in the present time only 0.7% of the households found mahua. Achar and tendu patta, the other two major NTFP, which were brought from the forest by 33% to 90% households, are rarely to be found in the forest now. Some tribal members noted that on occasion mahua and tendu patta could be found, but access was generally restricted to those who owned tractors and could travel greater distances while gathering supplies of fuel wood. Yet for the majority of tribal households, fuel wood and some cultivated vegetables account for the entirety of NTFP brought by tribal members.

Table 5.2. Contemporary Collection of NTFP for Consumption and Market in the Present (Number of households and percentage of households)

NTFP	Caste 1 ST		Caste 2 SC		Caste 3 OBC	
	N	N%	N	N%	N	N%
0. Data not available*	12	14.8%	55	40.4%	0	0.0%
1. Mahua (Fruit)	0	0.0%	1	0.7%	0	0.0%
2. Achaar (dry fruit)	0	0.0%	0	0.0%	0	0.0%
3. Tendu Patta (Leaves)	0	0.0%	1	0.7%	0	0.0%
4. Fuel wood	63	77.8%	70	51.5%	142	97.3%
5. Goond (Gum)	0	0.0%	0	0.0%	0	0.0%
6. Vegetables	42	51.9%	30	22.1%	23	15.8%
7. Awala (herb)	0	0.0%		0.0%	0	0.0%

Legends: *- Household that did not report, N –Number of households, N% - Percentage of households collecting each NTFP from the forest. (Survey Data 2010)

Tendu leaves that are collected are still sold in the market and so is the seed of the fruit mahua. The rest of the vegetables are used for personal consumption. Three individuals belonging to the ST mentioned that they used to get mahua, achaar, and goond and would sell in the market; this allowed them to live comfortably for six months. Now other than fuel wood, they get nothing from the forest. This same comment was made by 30 other households in their survey including ST and SC members.

The forests are gone and that is the biggest difficulty. We depended on the forest and now they are gone. We used to sell the goods and survive on it, the forests were close by earlier and we used to bring achaar, tendu, mahua and goond. Now there are only few trees of mahua and tendu left and that too the whole day is spent in just bringing wood (written on surveys that were completed on the households in the village).

Some noted that due to the extent of change in forest cover in the Baran district over the past 50 years, other associated environmental changes are now being observed. For example, one senior tribal member commented that due to the loss of the forest the monsoon season has changed, thereby resulting in additional impacts on community members.

Forests were close by, near the village. In about 40-50 years everything is gone. Since the forests have gone the monsoon season has also become short. Earlier we used to have four months of monsoon season; now we get only 10% of the rain we used to get (members of the OBC focus group).

5.4 Drivers of Change

Survey respondents were asked to identify the primary causes of change. Specifically, the objective was to identify any social or ecological factors that contributed to the decline in the use of NTFP. The sole factor identified by tribal members was the actual loss of forest cover that began more than 50 years ago, but has now intensified since the late 1980s.

Official reports suggest that forest cover had been depleted by approximately 50% in just two decades, from 31.15 km² of ‘recorded’ forest area in 1987 (Forest Survey of India, 1987) to 16.036 km² of ‘total’ forest area in 2006 (Forest Survey of India, 2009). Remote sensing maps reveal significant change in forest cover, with closed forest area declining from 14% to 11% of India’s total area, or a loss of 77,726 km² of forest (Roy, 2006). Regardless of measurement and other discrepancies that make it difficult to compare the officially reported numbers across time-periods (Government of India; Roy, 2006), the interview and survey data strongly suggest that the tribal people have experienced a real loss in forest cover which has affected their livelihoods.

5.5 Noted Reasons for Change

There is a range of factors that have likely contributed to deforestation in the Baran District over the past 50 years, including population growth (Census, Government of India, 2011), agricultural intensification (Haeuber, 1993b), commercial timber extraction (Haeuber, 1993a) road development, and large scale irrigation projects (Rajasthan Forest Government, 2011). Haeuber (1993a) identified British and later India’s prioritization of commercial timber production at the expense of local forest use as reasons for the deforestation. This included the enforced exclusion of rural populations from forested areas. Roy (2006) states that India as a whole suffered rapid deforestation after gaining independence, not only to increase agriculture production, but to bridge the gap between demand and production of fuel wood. He also added that the grazing pressures of the 400 million cattle present at that time challenged tree species regeneration and forest quality (Roy, 2006).

5.5.1 Population Growth

Increased demand for fuel wood is a function of population growth. Research conducted in rural Rajasthan concluded that almost all (99%) of household use biofuels for cooking and the

majority of the households (87%) use fuel wood for cooking (Laxmi et al., 2003). Table 5.3 shows population growth in India and in Rajasthan since 1901. According to the Government of India census report, the population was 238.4 million at the turn of twentieth century and over the course of the century increased by more than four times to 1,027 million. Population growth in Rajasthan (567%) is higher than the national growth (408%) over that same time period. One senior member of the ST focus group noted that “fifty years ago there were few Sahariyas (STs) and now the population has gone up; we now have 100 to 115 families.”

Table 5.3. Population Growth over the century

Census Years	Population in Million	Decadal Growth of India in %	Population in Million in Rajasthan	Decadal Growth of Rajasthan in %
1901	238,396,327	-	10.29	-
1911	252,093,390	5.75	10.98	6.7
1921	251,321,213	-0.31	10.29	-6.29
1931	278,977,238	11.00	11.75	14.14
1941	318,660,580	14.22	13.86	18.01
1951	361,088,090	13.31	15.97	15.2
1961	439,234,771	21.64	20.16	26.2
1971	548,159,652	24.80	25.77	27.83
1981	683,329,097	24.66	34.26	32.97
1991	843,387,888	23.68	44.01	28.44
2001	1,027,015,247	21.34	56.51	28.41
2011	1,21 billion	17.64	68.62	21.44

(Source: Census of India, 2001 and 2011)

Population growth has a direct impact on the availability of forest resources, especially fuel wood. As noted in Chapters 2 and 3, fuel wood gathered from the forest is the sole source of domestic energy in rural Rajasthan (i.e., for cooking and home heating). With population density increasing from 30 to 210 people/km² (Directorate of Census Operations, Rajasthan, 2011) fuel wood demand has greatly intensified during this time.

On average a Khanda Sharol household uses one kilogram of fuel wood per day in the summer (March to June), 1.5 kg during monsoon season (July to October), and 2 kg in the winter (November to February) (personal communication with BAIF staff on November 29, 2010). This consumption pattern amounts to an approximate annual use of 540 kg of fuel wood per household. This amount is equivalent to each village household exploiting one mature tree (about

25 feet in height) to meet their annual fuel wood needs (personal communication with BAIF staff on November 29, 2010). The consumption of fuel wood since the 1950s has exceeded the regenerative capacity of the surrounding forest. For example, in 2006, fuel wood demand was 7.45 million tonnes and the supply was a meagre 2.21 million tonnes (Rajasthan Forest Department, 2011a). The current and projected demand and supply of fuel wood from recorded and unrecorded sources was captured by Rajasthan Forest Department. Figure 5.1 below depicts the current and projected demand and supply of fuel wood.

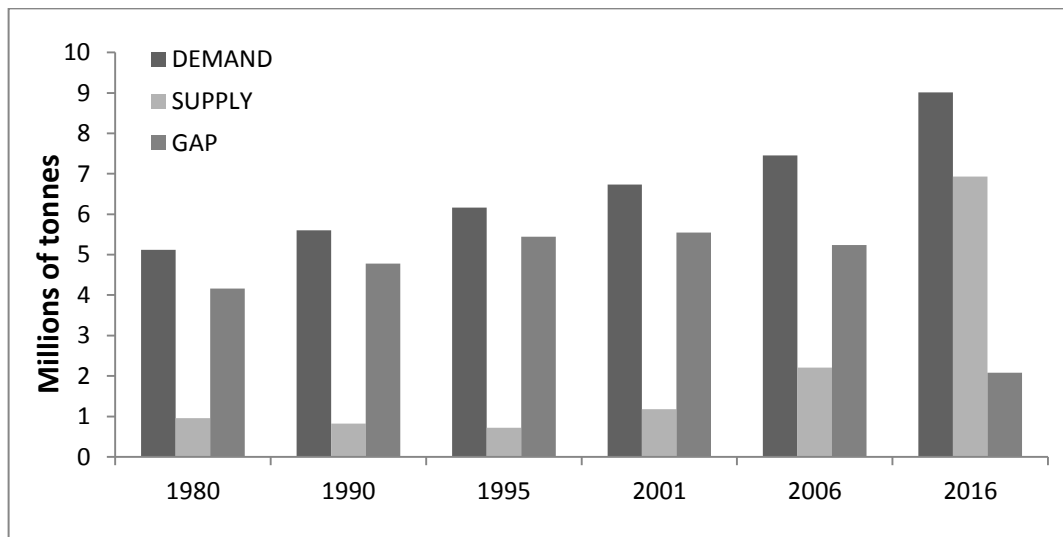


Figure 5.1. Current and projected demand and supply of fuel-wood (Source: Rajasthan Forest Department-- <http://www.rajforest.nic.in/mutual.htm>)

In an attempt to offset the rate of deforestation, regulations were introduced (National Forest Policy 1952, Forest Conservation act 1980) to limit the gathering of fuel wood to women and children only. With the progressive decline of neighbouring forest area, women and children are forced to devote considerable amounts of energy and travel time to satisfy their household's daily fuel wood needs. One ST woman stated during an individual interview:

The population has increased so everything is cut. We go about one to four Kosh (1 Kosh = 2.25 miles) one way to bring dead wood. Unless we bring wood we cannot cook.

Another ST woman noted:

We have to go very far to bring wood and we go together for safety reasons and we have to bring wood for fuel. No other means for cooking. Kerosene oil is very expensive and we cannot afford to buy a stove either. The whole morning from

8:00 am to 1:00 pm is spent in bringing wood (committee member from ST community).

Similar comments were made during other interviews and focus group meetings such as in the one shown in Figure 5.2 below. Although the fuel wood supply is expected to go up in the future, the gap between demand and supply still exists.



Figure 5.2. Picture taken of villagers during Focus group (Source: Researcher's personal album)

5.5.2 Livestock Production

Rajasthan has the second largest livestock population in all of India (56.66 million), of which 55.90 million is cattle and the balance comprises of buffalo, sheep, goats, horses, mules, donkeys, camels and pigs. As Table 5.4 indicates livestock production in Rajasthan has increased by 135% over the period 1951 to 2007 (Government of Rajasthan, 2011). This growth has played a key role in the conversion of forest land to uncontained pasture. Because livestock are generally left to graze in the forest areas, any chance of forest regeneration has been limited. One senior ST village member stated that as a result of grazing pressure on the forest “many species of plants that were used by the tribe are extinct now.”

Table 5.4.Livestock Population Growth in Rajasthan 1951-2007

Year	Total in millions
1951	25.51
1956	33.43
1961	34.50
1966	37.48
1972	38.87
1977	41.36
1983	49.65
1988	40.92
1992	48.44
1997	54.65
2003	49.14
2007	56.66

(Source: Government of Rajasthan, Animal Husbandry Department)

According to the Rajasthan Forest Department's overview of demand and supply of fodder for the livestock from forest and non-forest areas, demand is growing at an alarming rate. Figure 5.3 show the current and projected availability and supply of fodder. As seen in the figure below, since 1980s the supply of fodder has slowly increased. The gap in between demand and supply has decreased from the 1990s to 2006, but is increasing now (Government of India, 2010 (8th Plan)). The increasing gap is projected to widen in the future as there is no indication that the growth of livestock population will stabilize, let alone decline. The fodder supply is projected to increase in 2016 but the gap still will exist between demand and supply as in the case of fuel wood.

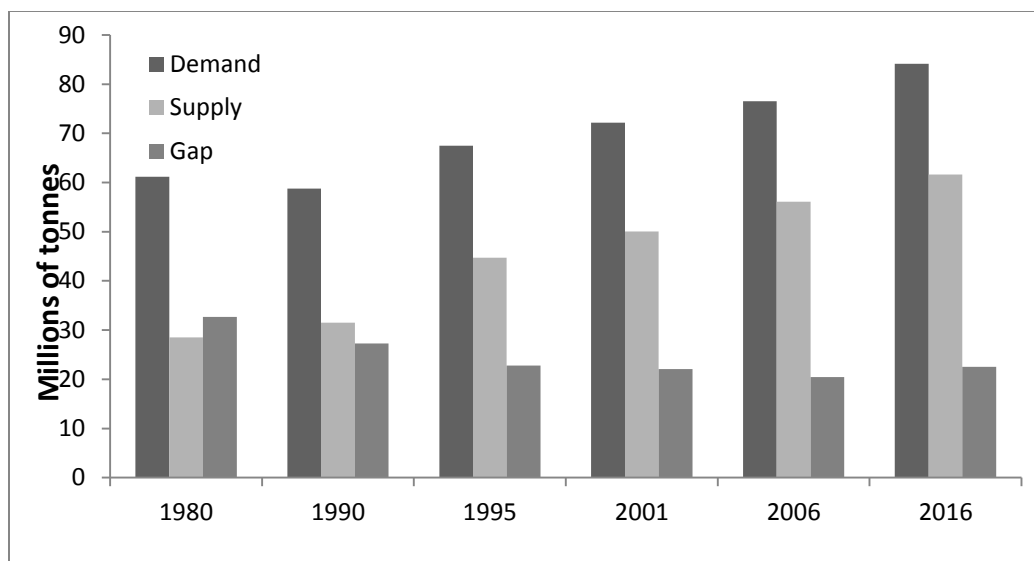


Figure 5.3. Current and Projected Availability/Supply of Fodder (Source: Rajasthan Forest Department-- <http://www.rajforest.nic.in/mutual.htm>)

At the time of this research, the total livestock population in the village was 769 with the majority owned by the highest caste households (Table 5.5). Only 61% of SC households own a local breed of cow which provides approximately one litre of milk per day (per communication with BAIF staff). Only 16.2% of SC households own a buffalo, which provides higher milk output than a cow.

Table 5.5. Livestock Ownership

Caste	Livestock population and percentages										
	Cow		Buffalo		Ox		Goat		Hen		Total
	N	N%	N	N%	N	N%	N	N%	N	N%	
1.ST	33	32.1%	0	0.0%	13	8.6%	27	14.8%	1	1.2%	74
2.SC	114	61.0%	23	16.2%	46	18.4%	62	11.8%	18	5.1%	263
3.OBC	257	84.9%	128	51.4%	39	15.8%	5	0.7%	1	0.7%	430
4.Other	2	100%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2
Totals	406	64.4%	151	26.6%	98	15.1%	94	7.9%	20	2.5%	769

Livestock total population 769

Legends: N –Number of households, N% - Percentage of households owing the livestock (Survey data 2010)

In addition to the impacts noted above (population growth, fuel wood demand, and livestock production) other factors have also contributed to the loss of forest cover in Rajasthan. The State Forest Report of 1997 found that between 1950 and 1980, 4.5 million hectares of forested land was converted to non-forest use. With an estimated annual loss of 0.15 million ha

per year the Forest Conservation Act (1980) was introduced in an effort to regulate diversion of forest land (Forest Survey of India, 1997). However, with the completion of a double lane highway (National Highway 76) that extends from Kota to Allahabad some of the once remote regions of Rajasthan were opened to other commercial and industrial interests that collectively removed more than 15,620 ha of forest cover (see Table 5.6 below). This does not include the population increase that has accompanied these developments and the subsequent intensification of agricultural production that has converted additional forest to agricultural lands.

Table 5.6 Forest Land Diversion in Rajasthan

FOREST LAND CONVERTED SINCE THE FOREST (CONSERVATION) ACT 1980 - 2007		
S. No.	Purpose	Forest Conversion (ha.)
1	Irrigation Projects	693
2	Hydro Projects	29
3	Mining Projects	4142
4	Railways / Roads	2234
5	Transmission Lines	840
6	Others	7680
	Total	15620

(Source: Rajasthan Forest Statistics, 2007)

5.6 Summary:

Data collected during study suggests that forest cover of Khanda Sharol region has changed dramatically over the past 50 years. The inhabitants of Khanda Sharol village are witness to these changes and are now coping with the current conditions. Once able to sustain themselves almost exclusively on the resources found in the forest, the villagers are now challenged to meet many of their most basic sustenance needs. These challenges have been attributed to the reduction of forest cover due in part to population growth, agricultural expansion and other forms of land conversion over the past 50 years. Although fuel wood and a limited number of non-cultivated vegetable species are still gathered from the forest, these NTFP are also becoming scarce, requiring greater effort and financial resources in their harvest. Residents fear that the forests which have long sustained the culture and economy of Khanda Sharol will be gone.

“The jungles have disappeared over the past 25 years or more. The place where the old colony is now, earlier we could hear lions from there. Now for the past ten years

nothing is left. The forest was about half a kilometer away; now, we have to go 4-5 km. to get firewood. If we need a bullock cart full of wood we would have to go about 10 km.” (member from ST Focus group). (See below a picture taken of the land about 2.5 km. from the village which had significant forest cover according to this senior.)



Figure 5.4 Picture taken by researcher of previously forest covered land (Source: Researchers personal album)

The above mentioned findings and subsequent discussion address the first two objectives of this study; these are as follows:

1. To explore the changes in forest cover within the state of Rajasthan, specifically in the tribal region of Khanda Sharol, Baran District.
2. To determine how changes in forest cover have affected access to and use of NTFPs by tribal households.

The next chapter (6) will discuss the implications of this change in forest cover on the social and economic conditions of the people of Khanda Sharol, particularly of tribal members who were dependent on forests for their livelihood; in addition it will also discuss the management aspects of the communal land acquired by BAIF.

Chapter 6

Implications of the Changes in Land Cover

6.1 Introduction

This chapter discusses how changes in forest cover may be contributing to declining social and economic conditions of tribal members (objective 3). While it cannot be stated unequivocally that the loss of forest cover in the Baran District has been the cause of the deteriorating well-being of tribal members in Khanda Sharol, forest conversion can be linked to shifts in household economic production which then can be tied to poverty, and subsequently impacts the health and education of tribal members. This chapter presents the work being done by BAIF to reverse these deteriorating social and ecological conditions through the introduction of a communal land holding designed to provide a more sustainable supply of NTFPs for domestics and market use. Finally, the chapter concludes with a discussion of the feasibility of continuing the community-based management system for the sustainable production of NTFPs (objective 4).

6.1.1 Economic Profile

As noted in Chapter 5, forest cover surrounding Khanda Sharol has changed dramatically over the past 50 years. This change has in turn affected the livelihood of the village members. Forest dependent people, i.e., those belonging to the scheduled castes (SCs) and scheduled tribes (STs), who previously were able to live comfortably by selling the forest-collected products in the markets, have now been forced to work as agricultural labourers. Table 6.1 shows the annual income range of the four groups within the village, along with the average, median, mode and standard deviation. Although the range in the ST community is from Rs. 12,000 to Rs. 100,000, in reality there is only one individual earning Rs. 100,000 who is the elected “Sarpanch” and receives a government salary. The second highest income earned is Rs. 65,000.

Table 6.1 Income Range of Households

Caste	Income Range in Rupees	Average Income (in Rupees)	Median	Mode	Standard Deviation
1.SC	12,000 - 100,000	27,988	25000	20000	14384
2. ST	10,000 - 110,000	33015	25000	25000	18302
3. OBC	14,000 - 500,000	75877	50000	100000	76990
Village	10000 - 500,000	49777	30000	25000	55654

(Survey data 2010)

According to Sengupta (2009) those earning less than Rs. 20 per day are considered to be living below the poverty line (Sengupta, 2009). Using this as a benchmark, a family of five should be earning an income of Rs. 36,000 per year to be above the poverty line. In Khanda Sharol 58% of all households live below the poverty line.

Table 6.2 Households below the Poverty Line

Caste	Total number of households	Number of households below Rs. 36,000	Percentage
1 ST	81	66	81.5%
2 SC	134*	95	70.9%
3 OBC	146	49	33.6%
Totals	361	210	58.17%

*Income information from two households was not available (Survey data 2010)

Sixty six families out of 81 (81.5%) of the ST community and 95 families out of 134 (70.9%) of the SC community are living below the poverty line (Table 6.2). Once able to sustain almost exclusively with resources gathered from the forest, these households now struggle for their daily existence as agricultural labourers; 5% of these households have members who are indentured and must work in the fields of others to repay loans.

One ST focus group individual commented,

We take loan and they cut from income and we work as bonded or slave labourers. If we are absent for some reason, the employer cuts more money per day than what he pays per day.

Although the ST, SC and OBC reported that they gathered NTFP from the forest, Scheduled Tribe members were the ones most affected due to their greater forest dependence.

While also utilizing NTFPs, the SC and OBC were less dependent, relying on the forest to provide mostly for their fuel wood needs. The SC and OBC also had other employment options with the SC performing cleaning, tanning, burial duties and other similar kind of jobs (as explained in Chapter 2) and the OBC assuming occupations as artisans, labourers and agriculturalists.

Approximately 10% of the ST and 33% of SC community households own irrigated land ranging from 1-20 beegha (1 beegha = 1.2 hectares or 12,000 square meters). About 49% of ST and 44% of SC households owned land that could not be irrigated with ground water, which means this was rain fed; the land owned ranged from two to 20 beegha. Thus households owning such land could only cultivate during the monsoon season. Forty three percent of ST families and 27% of SC families are landless (see land ownership table in Appendix 3). Landless individuals could work as labourers in others' fields. Agricultural production is for the most part labour intensive; the labourers mostly use oxen for ploughing except for some who are able to rent tractors. Fifty-six percent of the ST and SC community reported being a labourer as their primary occupation. The past year (2010) had a good monsoon season; hence 41% mentioned that agriculture was their primary occupation (Table 6.3). About 69% of the households listed being a labourer as their secondary occupation. One senior member from ST community commented as follows during focus group interview:

Some of us migrate for about two to two to two half months during summer or rainy season. We go a distance of about 100-150 km. For cutting one bheega of wheat we get Rs. 60 as income. If two people from a family work and cut wheat then we get wheat for four months.

In contrast, 74% of the OBC households cultivate on their own land and 20% earn from a secondary occupation of driving a vehicle, owning a store, or from rental income (renting tractors for ploughing). One inference from these observations is that in comparison to households belonging to OBC and Others (non-Hindus) communities in the village, the STs and SCs are struggling to make a living.

Table 6.3 ST and SC Household Primary and Secondary Occupation (Number of Households (217) and percentage of ST and SC households)

Occupation	Labour		Agriculture		Indentured labourer		Others	
	N	N%	N	N%	N	N%	N	N%
Primary	123	57%	88	41%	1	0.46%	5	2%
Secondary	150	69%	50	23%	10	5 %	7	3%

Legend: N= Number of Households, N% =percentage of households (Survey data 2010)

Table 6.4 OBC and Others Household Primary and Secondary Occupation (Number of Households (148) and percentage of OBC and Others (Non –Hindu) households)

Occupation	Labour		Agriculture		Indentured labourer		Others	
	N	N%	N	N%	N	N%	N	N%
Primary	36	24%	109	74%	0	0%	3	2%
Secondary	65	44%	50	34%	2	1%	29	20%

Legend: N= Number of Households, N% =percentage of households (Survey data 2010)

Scheduled Tribes and Scheduled Caste members earn less and do not own any land; hence, they end up spending their income on buying food (grains and pulses). Table 6.5 depicts average total expenses on main items such as food, health, education, recreation and social needs.

Table 6.5 Percentage of Income Spent on Various Categories of Expenses

	Scheduled Tribe (81 households)	Scheduled Caste (136 households)	Other Backward Class (146 Households)
Average Income	Rs.27,988	Rs.33,015	Rs.75,877
Food	51%	44%	39%
Health	10%	11%	10%
Education	4%	7%	15%
Recreation	1%	1%	3%
Social	11%	10%	8%
Asset Building	1%	0%	0%
Agriculture	8%	8%	11%

(Survey data 2010)

The ST and SC community households spent 51% and 44% of their incomes on food. Only members with irrigated or rain-fed land are able to grow grains or pulses for personal

household consumption. Among OBC and Others households their total food expenditure was 39% and 20% of total income. This difference can be attributed to OBC and Other households, land ownership and the ability to cultivate grains and pulses for consumption. Expenses shown in the table are not expected to add up to 100% because it shows the major expenses only. Although expenses on only the major aspects were collected in the surveys, 25% of ST and SC households reported expenses above 100% which indicates that they could be in debt. They borrow money from landlords and end up working on their fields to return the debts. For example, Sharma's (2005) study indicated that 70% of Sahariyas incur debt.

Other than food, the two major expenses reported by households are on health and social needs. Members of all the three lower castes (i.e., STs, SCs and OBCs), spend, on average, between 10 and 11% of their income on health. It is difficult to generalize whether this was because they were healthy or were not aware of their health condition. One reason could be because that there is no medical clinic in the village; members are able to consult with a doctor during occasional medical camps conducted in the village. The medical camps offer consultation and a limited range of medications but diagnostic treatments are unavailable. Money spent on medical expenses ranges from 0 to 120% among ST and SC members; 96.3% of households spent part of their income on health related expenses. Households end up borrowing money to pay for health related expenses.

India has a two-tier health system involving both public and private services. Those with the financial means have access to private health care while much of the general population receives necessary care at government run hospitals. Rural health care is the responsibility of Primary Health Centres (PHC). Each PHC serves a population of approximately 100,000 in about 100 villages. The PHC is led generally by a Medical Officer and his team of paramedical and support staff, an educationist, a female health assistant, a driver and a laboratory technician (Government of India, 2005). However, in the case of Khanda Sharol, no PHC is available. Because of this, community members must pay for service at privately run facilities in the region.

Other expenses reported by households relate to various social expenditures, such as those associated with marriage, childbirth, or funerals. On average, a household spends 11% of its income on social related activities. Educational expenses ranged from 4% to 26% with ST and

SC households allocating the least to educational expenses (further discussed in section 6.3). Approximately 60.5% of ST households and 52.9% of SC households did not report any educational expense. Twenty eight ST households and 30 SC household did not record any expenses on education though they had children within the ages of 6-18. Subjective questions as to why their children did not attend school were out of scope, with respect to this study's survey.

6.1.2 Health Profile

Poverty has a direct relationship with health. The scope of my study did not include collecting data of health issues of the residents of Khanda Sharol village, but the results of the National Family Health Survey No. 3 (2008) gives a brief description of the health issues of the rural areas of Rajasthan; these are listed below:

- i. Malnutrition is particularly serious in rural areas especially among teenagers and among the STs.
- ii. Stunting, underweight and under-nutrition are still a major problem.
- iii. Forty eight percent of the children below the age of five are underweight.
- iv. Between 60% and 69% of the children between the ages of six to 59 months were anaemic.
- v. Fifty Three percent of women in Rajasthan are anaemic, and higher among the STs and women belonging to lower income households.
- vi. Thirty eight percent of ST men and twice as high in men belonging to lower income households are anaemic.

Based on their study of household energy use, women's hardships and health impacts in rural Rajasthan, Laxmi et al. (2003, p. 55) noted that "gathering fuel wood involves a lot of hardship in walking long distances and carrying head-loads of fuel-wood that can cause health disorders in individuals (mostly women and children)." The same study concluded that women on average walked 2.5 km to collect fuel wood and made about 16 trips per month, spending three hours per trip. Further, women and children spent about 50 hours per week collecting fuel wood. The study also reported a number of health issues both for men and women including the negative impact on women in their child-bearing years. One outcome of this is lost working days which Laxmi et al. (2003) estimate to be equivalent to Rs. 29 billion. DeFries and Pandey (2009, p.130) similarly estimate "... that exposure to indoor air pollution from cooking with traditional biofuels is a major risk factor for respiratory and other diseases, causes 400-550 thousand premature deaths of women and children under five, and accounts for 4-6% of the national disease burden in India."

Although the data collected during this study did not explicitly examine the relationship between poverty and health, the findings suggest that a significant portion of the STs and SCs in particular is below the poverty line. If we extrapolate based on other studies referred to above, we can reasonably argue that poverty among the STs and SCs has resulted in serious health concerns. Therefore, a link can potentially be established as follows: change in forest cover affects the livelihood of forest-dependent people, which in turn affects poverty which then affects health.

6.1.3 Educational Profile

A significant impact of poverty is the lack of education of children. The village of Khanda Sharol has a total of 860 children under the age of 18.

Table 6.6 Population of children under the age of 18 in the village

Caste	0-5 age	6-18 age
Scheduled Tribe	71	117
Scheduled Caste	117	224
Other Backward Class	116	211
Total	304	552
Total	856	

(Survey data 2010)

Two hundred and forty seven children in the 6-18 age-group (44.5%) are enrolled in the three schools; of these 58 are in high school and the remaining 189 in the two elementary schools. The elementary school established exclusively for the ST community children provides a free mid-day meal. Despite this incentive attendance is usually less than 50% (based on personal observation as well affirmation by BIAF staff). For instance, during my visit to the school I noticed that only about 35 children out of the 85 enrolled were present (see Figure 6). The absentee children are either sick or they have to go to the forest to collect wood. The girls end up going to collect fuel-wood from the forest and helping their mothers domestically at home.

Rethinking Poverty, a report on the world social situation 2010, states that poverty has a higher impact on children, especially girls (United Nations, 2009). Girls' health as well as education suffers. In

comparison to a boy, a girl is much more likely to be pulled out of school (United Nations, 2009). Girls' education is not given much importance and their staying home is seen beneficial as they help out in household chores. Table 6.7 indicates that literacy rates among the STs and SCs is the lowest, especially among women.

Table 6.7 Average Literacy Rate by Caste

Caste	Men Average	Women Average
ST	35.8%	18.5%
SC	34.1%	16.1%
OBC	46.9%	28.8%
Total	40.0%	22.2%
		62.2%

(Survey Data 2010)



Figure 6.1 Picture of elementary school and children (Source: Researcher's personal album)

6.2 Summary

Data collected through this study shows that the ST and SC communities of this village are struggling to earn a livelihood. In their own words, members have stated that they lived comfortably when they depended on forests. Changes in forest cover have forced them to find employment as seasonal labours. Although a direct relationship between the deteriorating well-being of tribal members and changes in forest cover health of Baran district cannot be irrefutably deduced, change in forest cover can be linked to shifts in household economic production and a

general deterioration of the health and well-being of tribal members. In response to these conditions BAIF has acquired a communal land base on behalf of the village that is to provide for the sustainable production of NTFP.

6.3 Communal Land

The 135 hectare communal land acquired by BAIF for the development of Khanda Sharol is approximately 3 km. from the village. A short fence was erected around the land and a main gate was built. Two members from the village were hired as security guards for the land. The existing trees on the communal land were enumerated.

In 2006, BAIF hired mostly women and some men to plant various species of trees in the communal land. BAIF staff visit the land regularly to check on the growth and development of the plants sowed. Staff members are always in consultation with senior members of the village to determine what else can be planted in the land. As of April 2006, the land had 271 trees per hectare which includes various species - medicinal, timber, herbal, fuel wood, oil, fruits, fodder for domestic animals, and leaves to make disposable plates and cups. With the help of villagers BAIF has planted an additional 17,045 new trees, bringing up the total number of trees to 51,667; bring the total per hectare count to 382 trees. About 90 to 100 plants per hectare are expected to regenerate naturally. Since the communal land is being looked after now, it is expected that many more species of plants that have been lost over time will regenerate on their own.

To manage the communal lands, an eleven person committee has been established. Recognizing the importance of gender representation, six of the eleven members are women. Further, and although the communal land has been established for the benefit of the entire village, 50% of committee membership is from Sahariya Tribe, that is, Scheduled Tribe members. Committee appointments are for a term of 5-years. However, the committee has the discretion to remove and replace committee members if they fail to meet committee obligations, measured in part through meeting attendance and participation. Any changes in committee membership are to be witnessed by BAIF staff in order to make transparent all committee decisions and avoid perceptions of collusion. While ultimate authority for the management of the

communal lands in the hands of the committee, BAIF continues to perform an advisory and consultative role.

In terms of security the communal lands are fenced with thorny bushes, stone walls and barbed wire at some places with the help of the villagers (social fencing). To control access, a gate has been erected. Four men from the village have been hired to protect communal lands from free ranging animals and other potentially illicit interests. Security guards patrol the land during the day and provide some irrigation when possible.

Table 6.8 gives a list of existing trees and plants growing in the communal land.

Table 6.8 Tree and Plant species existing in the communal land

Plant name	Family name	Habitat	#of Plants	Common name	Use
<i>Acacia catechu</i>	Fabaceae	Tree	4500	Kair, Katha	Medicinal, fire wood, timber
<i>Ammannia baccifera</i>	Lythraceae	Herb	2800	Kuranta	Medicinal
<i>Boerhavia didffusa</i>	Nyctaginaceae	Herb	70	Pathar Chatta	Medicinal
<i>Diospyros melonoxylon</i>	Ebeaceae	Tree	2360	Tendu patta	Medicinal, Leaves used for making Indian cigarettes
<i>Dipterocarpus turbinatus</i>	Dipterocarpaceae	Tree	310	Garjan	Timber, fuel wood
<i>Ficus Benghalensis</i>	Moraceae	Tree	7	Bargad	Medicinal and food, shelter, fire wood
<i>Madhuca indica (Koenig)</i>	Sapotaceae	Tree	74	Mahua	Medicinal, fire wood, Timber
<i>Prosopis cineraria</i>	Fabaceae	Tree		Khejadi	Medicinal, firewood
<i>Terminalia bellirica</i>	Combretaceae	Tree	251	Baheda	Fruit, Oil from seeds, medicinal
<i>Zizyphus jujuba</i>	Rhamnaceae	Tree	400	Bair	Fruit, fuel wood, Medicinal

(Source: BAIF staff)

The various species of trees that have been planted by BAIF with consultation of senior members of the village are given in the Table 6.9.

Table 6.9 Trees and Plant Species Planted by BAIF in the Communal Land

Plant name	Family name	Habitat	Number of plants	Common name	Use
<i>Acacia nilotica</i>	Fabaceae	Tree	1400	Babul	Soil conversion and nitrogen fixing, medicinal, fire wood, timber
<i>Dendrocalamus Strictus</i>	Poaceae	Tree	1145	Bamboo	Construction, furniture, baskets, medicinal,
<i>Dalbergia sissoo</i>	Fabaceae	Tree	1000	Shisam	Fuel wood, shelter and timber, Medicinal
<i>Commiphora mukul</i>	Burseraceae	Tree	400	Gugal	Medicinal Tree, fuel wood, timber
<i>Pongamis pinnata</i>	Fabaceae	Tree	600	Karanj	Medicinal, firewood, vegetable
<i>Emblica officinalis</i>	Euphorbiaceae	Tree	1500	Amla	Medicinal fruit, food, fire wood, timber
<i>Aloe vera</i>	Asphodelaceae (Aloe family)	Herb	1500	Aloe Vera	Herbal

(Source: BAIF staff)

Although the committee has assumed responsibility for the communal lands, there is some concern about how the lands will be managed once BAIF is no longer involved. During interviews, committee members expressed the need for BAIF to stay involved. In addition, other community members expressed the same need for BAIF to maintain some level of involvement to help ensure that the communal lands are managed for the benefit of ALL village members. This conveys the sense that the village members are not confident of managing the community land on their own. Therefore, it appears reasonable to conclude that it is infeasible to continue the community-based management system for sustainable production of NTFPs without the presence of BAIF at least in the short term.

The next chapter is the concluding chapter highlighting the findings and some limitations of this research. The chapter also outlines the contributions of this research as well as opportunities for future research.

Chapter 7 **Conclusions**

7.1 Purpose of this thesis

The purpose of this thesis was to highlight the changes that have occurred in the region of Khanda Sharol as seen by the inhabitants of the village. Through this thesis it is hoped that by making apparent these changes, and by identifying the important role NTFP have had on the livelihoods of the Khanda Sharol residents, greater attention and collective care will be afforded to the sustainable management of the newly established communal lands. It is also my sincerest hope that this research will contribute in some small way to improving the quality of life shared among all residents of Khanda Sharol. It will also give a better understanding of what was the past and what is being done to improve the future. As said earlier, acquiring a communal land for development is a rare occurrence in India and knowing how it has affected its members will be important for future projects. The data collected can be used in the future for a longitudinal study.

7.2 Response to Objectives

The data collected during this research appears to suggest that forest cover has changed in the tribal region of Khanda Sharol. The change in forest cover has affected access to and use of NTFP by the tribal households similar to other regions in India. Although a direct relationship between loss of forest and the deteriorating well-being of individuals could not be clearly identified through these data, forest loss can be linked to shifts in livelihood patterns which have led to poverty, declining health and education of its members. Noting the declining condition of the village members, BAIF acquired a communal land to provide a sustainable supply of NTFPs for the village. The members are being trained to work together to take care of the communal land.

7.3 Summary of Findings

As noted in chapter 5, forest cover has declined drastically over the past 50 years in the Baran District region. Tribal members who lived comfortably on forest products are now struggling to earn a livelihood. These struggles have been associated with the depletion of forests

brought about by an increase in population (both human and livestock), agricultural expansion and land conversion during the past 50 years. Although Khanda Sharol village members still depend on the forest for fuel wood, NTFP that are gathered now are nowhere close to the number of species collected or the quantity that they used to gather in the past. Village members are scared of losing the forests which were important to their culture and source of livelihood. The ST and SC members of the village are especially bearing the brunt of the loss of forests, with changes in the means of livelihood, shifts in household economies and deteriorating health and well-being.

7.4 Study Limitations

The limitations of this study include: (1) scope of research, i.e., one village (2) the method of data collection, calling into question reliability and accuracy of data and (3) possible exaggeration of problems by the villagers. The scope of this research was only one village which can be considered to be very low as there are many villages in the tribal regions of India. Hence it can be difficult to generalise the results. During this study a significant amount of data was collected regarding people's views pertaining to changes in forest cover, but unfortunately pictures proving the fact could not be obtained due to lack of satellite images from previous years. The reliance on data obtained through interviews with village people can be considered as one of the limitations of this research. Although the data show that livelihood of members of the village has changed and change in forest cover has led to income variations, a direct link could not be established for change in the well-being of the villagers. Another limitation is that data regarding historical patterns of NTFP collection by the villagers was based on their memory which may be inaccurate. Efforts were made to crosscheck the data so as to increase the reliability and accuracy. Similar questions regarding NTFPs were asked to each senior member to confirm the findings. All members were asked if they agreed with what was being relayed.

7.5 Contributions

The study makes several contributions; these are discussed below.

7.5.1 Field of Research

This study adds to previous literature by confirming the importance of NTFP to the livelihood of tribal people; therefore, it enhances the generalizability of this stream of research. The study addresses a gap in the literature by examining the impact of deforestation on the collection patterns of NTFP as well as the impact of these collection patterns on the livelihood of tribal people (including income, education and health). The findings of this research provide NGOs like BAIF get a better understanding of the issues prevalent in the regions and will enable them to provide appropriate interventions in Khanda Sharol and similar tribal regions. The communal land developed by BAIF is still at the plantation stage. New plants are being planted in consultation with senior members of the village. Data collected through this study can be used in the field of research for comparative studies with other tribal regions of India as well as for a longitudinal study of the same region in the future. This model of development can potentially be replicated around the globe.

7.5.2 Participating Communities

Collection of demographic data of the village and having an insight into changes in land cover, livelihood parameters and issues linked with poverty, education and health through this thesis will be very useful for BAIF in the future for providing appropriate interventions. As BAIF is involved in developmental work in different regions of India, this data will be useful for conducting comparative studies in other regions. BAIF had obtained communal land for another region in the same state; comparative studies will be helpful to both villages to learn the pros and cons from each other. BAIF's continued involvement would be a key factor for the sustainable development of this community based system in Khanda Sharol at least in the short term.

7.6 Opportunities for Future Research

The present study provides the groundwork for developing appropriate interventions for the region. The next step is to examine the management and governance of communal land, as well as the outcomes of the community-based model. Such studies would allow researchers to develop workable and sustainable models.

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Appendix 1

Family Information Report (Survey)

Date _____

1. Household Identification:

State	District	Tehsil	Village	Family Number

2. Name of the head of the Family: _____

3. Religion: _____

4. Caste: Scheduled Tribe/ Scheduled Caste/ Other Backward class/ Others

5. Family information:

	Description	Male	Female	Total
Children	Less than 5 years old			
Youth	6- 18 Years old			
Adults	18-60 years old			
Seniors	61 and Above			

6. Family description: Joint family/ Single Family

7. Literate people in the family Males _____ Females _____

8. House Description Mud house: _____ Brick House: _____

9. Occupation in the family: Main _____ Secondary _____

Family Income _____

10. Land ownership: Landless/ Un-owned land / Owned land /Partnership / Land given for lease/ Land taken on Lease

11. Description of land owned:

Total agriculture Land in Bigha (.2529 Hectares)			
Irrigated	Rain Fed	Fallow	Total

12. Crop Description:

Khariff (Rainy season)

Rabi (winter season)

13. Livestock description:

Description	Total Number	Description	Total Number
Non-descript cow		Goat	
Good Breed Cow		Sheep	
Non-Descript Buffalo		Hen	
Ox		Other	

14. Migration Patterns:

- a. Number of days you migrate in a year?
- b. Which season do you migrate?
- c. How much do you earn during migration?
- d. Reasons for migration?
- e. In which season it is difficult to generate income?

15. Information about NTFP:

- a. Traditionally what did you bring from Forest?
- b. How is the situation in the present?
- c. What are the reasons for change?

Information on daily food acquirement

Food bought from Market					Food grown at home					Food brought from Forest				
Fruit	Vegetable	Cereals	Tubers	Grain	Fruit	Vegetable	Cereals	Tubers	Grain	Fruit	Vegetable	Cereals	Tubers	Grain

Reasons for unavailability of daily food:

No money to buy	Not available locally	Do not have knowledge of availability	Do not have awareness of products	Other reasons

What months are most difficult to earn a living?

Information of Yearly Expenses:

Buying Food	Health	Education	Asset Building
Recreation	Social	Agriculture	Others

Survey completed by: _____

Signature: _____

Appendix 2

Interview Questions

Preliminary Questions:

1. Which category best fits your age group?
 - a. 20-29
 - b. 30-39
 - c. 40-49
 - d. 50-59
 - e. 60+
2. Male \ Female (not asked)
3. How long have you lived in Village Samrania?
4. What is your general perception of the communal land now?
5. What is your perception of the land in the future for the next generation?
6. Why is this piece of land important?
7. Do you think you will get fair access to products from this land?
8. Do you think you will get equal grazing rights for your animals on this land?
9. If you survived on Forests, what all did you collect from the forest?
10. How has it changed?
11. What challenges have you faced in gathering NTFPs?
12. Are there enough varieties of NTFPs available on this land?
13. What other species of trees would be beneficial?
14. In your opinion who do you think will benefit from this land?
15. Will everybody have equal share of the NTFPs?
16. How do you plan to manage this land in the future?
17. In your opinion what should be the role of BAIF in the management of these lands in the future?
18. What kind of help would you need from BAIF?
19. What was your source of income in the past?
20. How do you spend your time with focus on land, occupation, education and diet habits?

The next six questions are for women only.

21. As a woman do you think you will get equal rights on this land?

22. From your point of view what do you think should be your rights and responsibilities in respect to this land?
23. How do you see the future of women in your tribe?
24. How do you collect fuel wood? Has the method changed?
25. Is there safety issues connected to collecting fuel wood?
26. What kind?

The next two questions are for men only.

27. From your point of view what do you think should be your rights and responsibilities in respect to this land?
28. (a) From your point of view what do you think should be the rights and responsibilities of women in respect to this land?
(b) Why? (This is in continuation to the previous question.)
29. In your opinion what would be your social responsibility in maintaining and protecting this communal land?
30. What do you think is your role in creating assets for your community?
31. Would you be willing to participate in a secondary interview if necessary:
 - a. Yes
 - b. No

Appendix 3

Land Ownership by Community

Caste	#of HH	Landless		Untitled		Ownership				Partnership		Lessor		Lessee	
		N	N%	N	N%	Irrigated		Rain fed		N	N%	N	N%	N	N%
SC	81	35	43.2	6	7.4%	8	9.9	40	49.4%	2	2.5%	6	7.4%	0	0.0%
ST	136	37	27.2	4	2.9%	45	33.1	60	44.1%	0	0.0%	5	3.7%	2	1.5%
OBC	146	23	15.8	1	0.7%	84	57.5	60	41.1%	1	0.7%	3	2.1%	13	8.9%

Legends: # of HH- Number of households, N –Number of households, N% - Percentage of households (Survey Data 2010)

Appendix 4

Latin and common names

Amla	<i>Emblica officinalis</i>
Aloe Vera	<i>Aloe vera</i>
Baheda	<i>Terminalia bellirica</i>
Bair	<i>Zizyphus jujuba</i>
Babul	<i>Acacia nilotica</i>
Bamboo	<i>Dendrocalamus Strictus</i>
Bargad	<i>Ficus Benghalensis</i>
Ber	<i>Ziziphus mauritiana</i>
Dudhi	Long Squash
Garjan	<i>Dipterocarpus turbinatus</i>
Gilondi	<i>Limonia acidissima</i>
Gugal	<i>Commiphora mukul</i>
Jowar	<i>Sorghum vulgare</i>
Kakora	Cucurbitaceae
Kair, Katha	<i>Acacia catechu</i>
Kaitha	<i>Limonia acidissima</i>
Karanj	<i>Pongamis pinnata</i>
Karela	Bitter gourd
Khejadi	<i>Prosopis cineraria</i>
Kuranta	<i>Ammannia baccifera</i>
Mahua	<i>Madhuca indica (Koenig)</i>
Millet	<i>Pennisetum typhoideum</i>
Pathar Chatta	<i>Boerhavia didffusa</i>
Shisam	<i>Dalbergia sissoo</i>
Tendu patta	<i>Diospyros melonoxylon</i>