Livelihood Options

A Study on the Charcoal Workers in four districts of Gujarat Rajkot, Surendranagar, Patan and Kutch

For

CARE India, Gujarat

CARE India, Gujarat

Conducted by

SAVE

Saline Area Vitalization Enterprise

2004

PREFACE AND ACKNOLEDGEMENTS

From the time of the famous "*Tryst with destiny*" which celebrated austerity over materialism to the present era of globalization that celebrates materialism, India has come a long way. Unfortunately this does not seem to be true for a large part of our society that has been left behind. India may be the largest milk producer but children here still die due to lack of nutrition, its godowns may be filled up with grains but people still die of starvation. The islands of prosperity that have bedazzled the world have unfortunately led to further marginalisation of the oceans of poverty, which surround them. Ironically states like Gujarat, which represents the better face of India's march towards development too are unable to satisfy the basic needs of a section of its citizens who remain exploited and suppressed.

The failure is not due to lack of intention but has more to do with the increasing dualism in the society which is aggravated by several factors which are external and uncontrollable as well as internal and human induced.

Arid zones of Gujarat are the focus of this study and the following pages are with reference to the areas of Rajkot, Surendranagar, Patan and Kutch all lying in the arid and semi arid zones of the state. These areas have suffered the wrath of umpteen numbers of natural calamities some of which get highlighted due to the high visible loss of lives and wealth while others go unnoticed due to their slow pace and impact.

These regions, due to their unique agro climatic conditions, the type of vegetation, geo-hydrology etc also has certain unique occupational structures that provide cushion against the unreliable agriculture.

The resourcefulness of human beings has helped him to face any adversity and convert threats into an opportunity. Prosopis Juliflora[1] is one such phenomenon which was introduced as a panacea to the dangers of desertification, turned into a threat due to the high rates of propagation and was converted into a resource to be utilized as a source of livelihood by many.

This research is an attempt to strengthen this resourcefulness and aid in decision making for external development agencies like CARE which has identified some of the unique livelihood sources of the arid zones as a focus area. Use of Prosopis to produce charcoal is one such livelihood activity.

Saline Area Vitalization Enterprise has conducted this study for CARE India in Gujarat and would like to thank CARE India for providing an opportunity to carry out this study. Various organizations and individuals other than the study team have provided useful insights and suggestions.

The first part of the report deals with the overall context in which the study is conducted and the general overview of the charcoal trade in the country and Gujarat. It also brings insights into the raw materials used for the production of Charcoal and the processes involved in the processing of charcoal.

The second section of the report provides the details of the findings from the primary research conducted by the team members of SAVE and is a factual scenario existing in the trade in the areas of study. The inputs have been taken from the people who are directly involved in the trade either as workers or traders.

---

[1] *Prosopis Juliflora a plant species belonging to the Mimosaceae family and known as Mesquite in English and Gando Bawal in the local dialect. Details in Chapter 2*

This section also deals with the environment analysis, the legal and ecological aspects and has insights into the problems associated with the trade, the government machinery involved and the requirements for legally undertaking the trade.

The third section presents suggestions after analyzing the overall situations in the value chain. The possible interventions that agencies and more specifically CARE can undertake.

SAVE would like to acknowledge the support provided by the following organizations:

-Self-Employed Women's Association, Radhanpur
-Deepak Charitable Trust, Tikar, Ta. Halvad, Dist. Surendranagar
-CEE, Morbi
-Gram Swaraj Sangh, Rapar
-Prayas, Anjar

It would also like to thank the following individuals for taking out time to provide useful suggestions for the report.

Mr. B M Chaudhary	Range Forest Officer, Santalpur
Mr. Jalundhra	Range Forest Officer, Anjar

The SAVE Team

Team Leader	Mr. Rajesh Shah
Team	Mr. Gaurav
	Mr. Ghatit Laheru
	Mr. Jesang Thakore
	Mr. Hemraj Patel
	Ms. Smita Gautam

Rajesh Shah
Managing Director
Saline Area Vitalization Enterprise Limited
Ahmedabad
30th of December 2004

TABLE OF CONTENT

Section 1
Introduction

Chapter 1
Study Context

1.0 Background of the Study

The usage of charcoal as a refined form of fuel wood has continued from centuries. It still remains an important energy source for domestic cooking and a wide range of industrial and processing applications, such as manufacturing of activated carbon and calcium carbide, reduction of iron ore in the steel industry, black smithies, cloth ironing, heavy-clay soil conditioner, orchid planting medium, etc.

The wide usage and usefulness of charcoal as a source of energy has many a time faced resistance fearing its role in large-scale deforestation and low efficiencies in production leading to wastage of fuel wood.

The apprehension is not unwarranted but is also not the complete truth. While unsustainable practices do exist, experiences in many countries also show the contrary, where charcoal making does promote tree production and a wiser use of tree resources, in addition to income and employment generation for local people. The documented examples include charcoal production from plantations for the steel industry in Brazil; 20 year (sustainable) practice in natural mangrove forest management for charcoal making in Southern Thailand and Peninsular Malaysia; over 40 year practice of small farmers in the Rhizophora cultivation for charcoal. Other notable examples are: charcoal production systems from waste wood in sawmill and from rubber tree replanting programmes in many south east Asian countries and the production of coconut-shell charcoal (e.g. Philippines, Indonesia, Sri Lanka, South India and Thailand), carbonized sawdust briquettes industry etc.

Charcoal and its derived products have also become an increasingly important commodity in the international trade. In India, old records show that charcoal production has been quite important in the past but later it apparently was marginalized due to a general scarcity of fuel wood and in some cases substituted by coal. Lately however, there has been an upsurge in demand for charcoal for industrial application, notably from calcium carbide and activated carbon manufacturers. **Considering the potential fuel wood supplies from social forestry and wasteland development programmes in India, an excellent opportunity exists to meet such an upsurge in demand from modern industries in addition to the many traditional applications.** However, due to a lack of understanding coupled with very limited availability of data at present on how charcoal production and marketing systems operate, it is very difficult, for the development planner to make an appropriate assessment or attempt an intervention in charcoal making activity as part of sustainable development process.

It was this lacuna that was to be addressed by CARE India before intervening into the livelihood aspects of the arid and semi arid areas of Gujarat. CARE has identified charcoal producers as one of its probable target population.

2.0 Aim and Objectives

- ***Assess the Status of the Charcoal workers in the identified villages***

The status paper includes baseline studies on the socio economic conditions of the Charcoal Workers. It also incorporates issues related to Health and Gender. The research also includes present value chain from the production to marketing and the various stakeholders involved in the chain.

- ***Assess the ecological and economic impact of Charcoal Production***

The purpose is to find out the technical, market and financial feasibility of undertaking and promoting such an activity as sustainable livelihood option. Along with this, ecological impacts of such a process would also form a part of the study for the decision makers. This also helps to recommend up scaling of the ongoing operations/ finding alternative livelihood options/complimenting the activity with possible value additions etc.

- ***Identify and Analyse administrative and legal issues in undertaking Charcoal production and sale.***

The purpose is to find out the intent of the state Government in promoting such an activity and possibilities, viability, sustainability of such an initiative and finding advocacy issues.

- ***Link up the charcoal Production to a larger issue of Rural Energy and Wasteland Development***

3.0 Research Design

The highly dispersed and unorganized setup in which the charcoal trade survives requires insights rather than mere data. It was this requirement and the understanding of the rural scenario that qualitative aspects through discussions and interviews were complimented by the quantitative data.

There are six players who can be identified in the immediate environment of whole Charcoal trade and in order to get a holistic view it was necessary to get insights into all the players. The primary layer included the Charcoal Producers who are at the bottom of the pyramid, the village charcoal collector, and the trader. Besides in the immediate environment are the villagers, the Forest Department and the Revenue Department of Government of Gujarat.

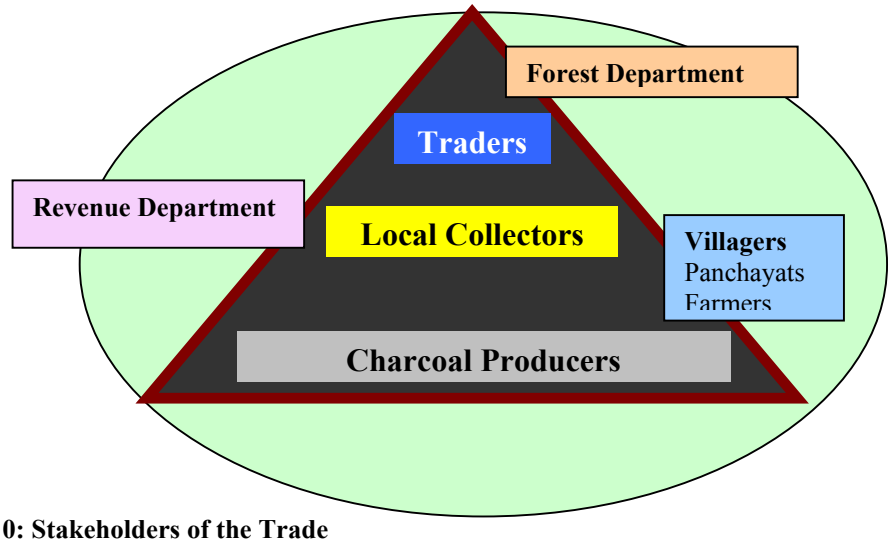


Figure 0: Stakeholders of the Trade

3.1 Target Population

Four districts have been identified for undertaking the study. These districts are Patan, Surendranagar, Rajkot and Kutch. Rajkot belongs to the Saurashtra region while Surendranagar and Patan belong to North Gujarat region.

The areas that have higher salinity owing to their proximity to the Little Rann of Kutch or the sea have a larger vegetation of Prosopis. These are the areas where charcoal production is carried out at a larger scale along with other livelihood focus areas of CARE – Salt production and Fisheries.

Table 1: Target Area for the study

District	Taluka	Number of Villages	Villages undertaking Charcoal trade*	Villages Selected for Study
Patan	Santhalpur, Radhanpur, Sami	73+56+98=227	30+28+34=92	1+1+4=6
Surendranagar	Halvad, Dhranghadhra, Patdi	68+63+88=219	31+10+30=71	1+2+4=7
Rajkot	Maliya	76+47=123	14	2
Kutch**	Rapar, Bhachau, Anjar	97+69+64=230	25+15+11=51	2+2+1=5
Total	10 Talukas	799 Villages	228 Villages***	20 Villages

*Multiple sources have been used to arrive at the figures. The revenue and forest department records only mention villages that have applied for permits, other than that there are villages where the charcoal production is carried out by laborers on the roadside and in a scattered way. The figures are a combination of the government records and the list prepared after discussions with the traders and NGOs in the area.

**In three districts the talukas have been identified looking at their proximity to the Little Rann of Kutch that has a larger availability of Prosopis. In Kutch charcoal work is carried out at varying scales in most of the talukas, however the Wagad region i.e. Rapar, Bhachau and Anjar talukas are known for charcoal production. Therefore these three talukas have been taken up as the targeted talukas for the study.

*** Out of these there are villages where the workers migrate to other places for charcoal production. About 150 villages have more than 30 families that undertake charcoal making on a regular basis. The sampling was done from the list of these villages.

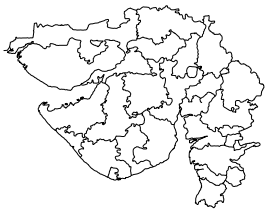
Table 2: Villages Selected for Sample

S.No	District	Taluka	Villages
1	**Patan**	Santhalpur	Aanternes
		Radhanpur	Agichana
		Sami	Anwarpura, Lalpur,Rafu,Gujarvada
2	**Surendranagar**	Halvad	Tikar
		Dhranghadhra	Kuda, Thala
		Patdi	Dhama, Mera, Gochanna, Kochada
3	**Rajkot**	Maliya	Vavaniya, Kajarda
4	**Kutch**	Bhachau Anjar Rapar	Janan, Kakarva, Khirsara, Thanpar, Rav Moti

In the 228 villages identified as undertaking the charcoal production, with an average of 30 families undertaking the trade the total targeted population comes to approximately 6,000 charcoal producers. This is however a rough estimate as no data has ever been collected with regards to the number of charcoal workers owing to the highly unorganized set up, mixed with the lack of legal clarity and the seasonality of the trade.

3.2 Sample Selection

Based on the list of villages provided by NGOs, the Forest departments and traders regarding the villages in which charcoal is being produced, a random sampling was done to arrive at the name of the villages for conducting survey. However at some point of time due to migration of the villagers involved in the charcoal production, snowball sampling was resorted to. As on reaching the villages identified based on the random sampling the

Map Showing: Project Talukas covered under Charcoal Study, Gujarat, INDIA SAVE Saline Area Vitalization Enterprise Ltd. Ahmedabad.	Gujarat. 	Gujarat, INDIA. 	SCALE: NOTE:	N DRG.NO 01

stakeholders were either in very small numbers or had migrated[1] during this season for the cultivation of Cumin (*Zeera)* to Saurashtra and other regions or for charcoal production to Kutch.

3.3 Sampling Unit

Individual Households with at least one person involved in charcoal production formed the sampling unit in the identified villages.

3.4 Sample Size

20 villages were selected out of the 150 villages for carrying out a detailed family study. 84 charcoal producers were interviewed at an individual level while focus group discussions were carried out at the hamlets of these charcoal producers.

3.5 Methodology

In an attempt to understand and provide a bird's eye view of the whole situation, massive literature search has been done. The purpose was to bring the insights of various experts and practitioners involved in different aspects of the value chain to aid in decision making and planning interventions. Significant amount of research has been done on charcoal and the raw material used in Gujarat by researchers within the country as well as outside the country. An attempt has been made to bring together some of the important findings of these researchers from secondary sources.

Tools of PRA were attempted at wherever possible and feasible (given the constraints of time and the interest shown by the subjects of information). Focus group discussions with the primary stakeholders i.e. the charcoal producer was carried out at in all the villages. This was followed by a structured questionnaire with the respondents randomly selected among the target population. After the focus group discussions few families were selected randomly. The number of families selected varied according to the variance in the practice of the trade in the village.

3.6 Sources of Primary Information

Primary Data Source

- Family of Charcoal Producer
- Charcoal Collector and local trader
- Large Trader
- NGO workers in the village
- Forest Officers

Secondary Data

Articles, Newspaper clippings and Websites

Data Collection Tools

- Structured Questionnaires were used for individual families.
- Focus Group Discussions with the Community involved in the trade.
- Checklist of questions was used for interview of the Forest Officers.
- Observation

[1] *Most of the charcoal workers are agricultural labourers; charcoal production is a source of supplementary income for these workers that they resort to when there is no alternative in the form of agriculture.*

Chapter 2
Prosopis Juliflora-The Raw Material

1.0 Introduction

Prosopis Juliflora is a plant species belonging to the **Mimosaceae family** and known as **Mesquite in English** and ***Gando Bawal*** in the local dialect. *Prosopis* species form a major component in dry land ecosystems in the America, Africa and Asia. The main introduced species, ***P. juliflora***, is now pan tropical in arid and semi-arid zones.

Prosopis juliflora is native to the West Indies, Central America and northern South America (Venezuela and Colombia), but it has been planted in arid zones in many parts of the World. It is the only species of the genus in Central America, where it is confined to the dryer regions of the Pacific slope. In Panama, the species grows in the remnants of forests on the Pacific slope corresponding to the life zones of the tropical dry forest. **In India, it is now branded as an invader species that competes with other native species.**

Prosopis juliflora is a fast-growing, deciduous tree or shrub that is thorny and has a wide crown and deep roots. Zigzag branching, stretched out over the crown, is characteristic of the species. The tree can reach between 3 to 12 m in height, depending on where it grows. It frequently grows as a shrub, with the trunk twisted and the crown broadened in the shape of a parasol. The species grows in very hot, dry climates, with temperatures up to 48 °C and annual precipitation from 150 to 750 mm. It is found from sea level to 1500 m. The roots penetrate to great depths in the soil searching for the required water. If root growth is not obstructed, the tree can grow in a variety of soils, including saline and alkaline areas and in sandy and rocky soils. The tissue of *P. juliflora* is photosynthetically active throughout the year, presenting a superficial and widespread radicle system through which the tree fully exploits the available hydric resource.

The species has great value in agro-ecosystems in very dry locations where it is used as firewood and charcoal. The high caloric capacity of the wood produces a high quality charcoal and small-dimension wood yields between 5 to 15 tons per ha. per year. The flowers are an important source of nectar for the production of high quality honey. The bark is a good source of tannin, and rubber can be obtained from the trunk. The legumes and the seeds are used as cattle feed which the species produces 20 to 40 tons per ha. per year, beginning at 2 to 3 years of age. The pods have also been ground and used as flour. Because *P. juliflora* resists drought and fixes nitrogen, it is valuable in agro-silvopasture, mining projects, dune stabilization, and the recovery of degraded soils.

About Prosopis

Family	Mimosaceae
English Name	Mesquite
Local Name	Gando Bawal
Calorific Value	4800 k Cal
Specific Gravity	0.70

2.0 Prosopis in Gujarat

Prosopis juliflora is an aggressive and invading species that has spread rapidly due to its great tolerance to the extremely refractory conditions in the northwestern arid zone of the Gujarat state. Consequently, it constitutes about 30% of the vegetation cover in this unique

and diverse ecosystem. It is the only promising species capable of supplying a renewable source of raw materials used in various cottage and small-scale industries. The high inherent coppicing capacity of *Prosopis* is a major-factor contributing to the renewable nature of this resource. Regarding the use of *Prosopis juliflor*a, some studies have been conducted for livestock feed by Gujarat Agriculture University, Anand and Vivekanand Research and Training Institute, Mandvi-Kutch. Gujarat State Forest Development Corporation, Ltd. (GSFDC), has used this species since 1981 for forest products: pods, gum, honey, wax, and charcoal. Moreover, this species has been chosen by the Forest Department for intensive afforestation programmes under different schemes to check desertification in the refractory areas.

The *'Prosopis* debate' has become an important topic of discussion and policy in India during recent years, primarily due to *Prosopis Juliflora* becoming an aggressive weed in several states. Invasion of grasslands, protected forests and nature reserves has alarmed ecologists. Invasion of irrigation channels and arable land has affected the agricultural community, and landowners threatening their livelihoods. These groups have put pressure on state governments, to stop further planting of *P. juliflora* and begin eradication programmes, notably in Gujarat, Rajasthan, Haryana and Tamil Nadu. On the other hand there are a few ecologists and environment activist who strongly put forward the case for P. Juliflora.

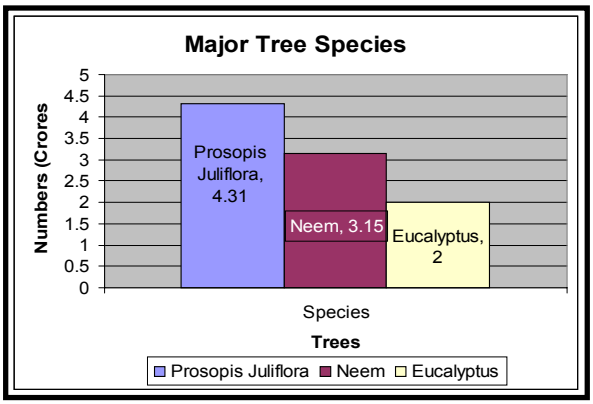
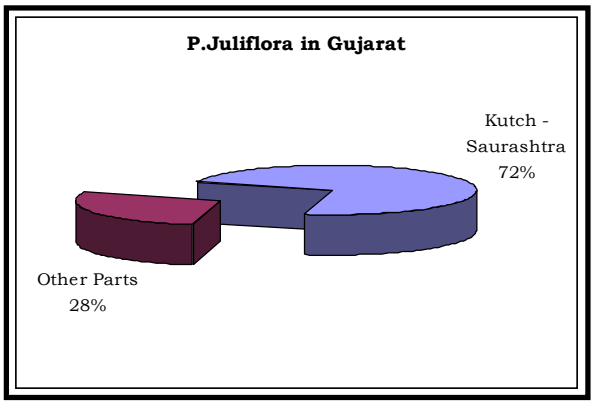


Figure 1: Prosopis takes over others in Gujarat

Vivekanand Research and Training Institute, Mandvi-Kutch, has installed a livestock-feed manufacturing plant. The Institute has succeeded in preparing highly nutritive livestock feeds from these pods after seed separation. The whole project provides employment to the rural poor through collection of pods. The project also provides a highly nutritive cattle feed that is cheaper than other available cattle feeds.

Cutting of the P Juliflora and conversion into charcoal (it forms part of the Non Timber Forest Produce and hence comes under the purview of the Indian Forest Act 1927) is illegal on the forestland, which creates confusion regarding the intent of the government to protect or remove these species. We do not put forward a case for or against the matter. The fact of the matter is that *Prosopis* is playing a vital role in sustaining the livelihoods of the rural poor, including the landless, small farmers and artisans - the least vocal groups of society. **These groups want a means to increase the value of this tree, not eradication. In rural areas, *P.juliflora* is often the only source of fuel, small round wood and dry season fodder, and provides the *only* income for many families.**

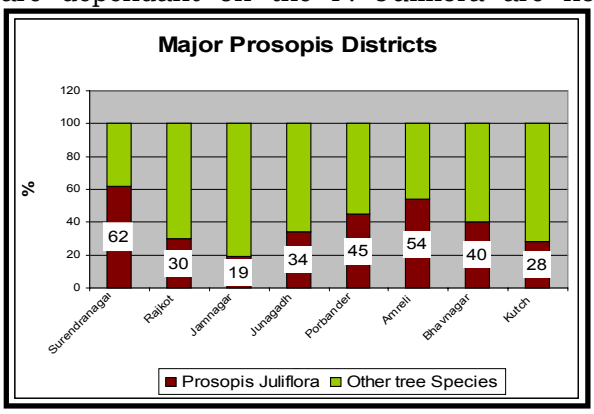
During our discussions with Mr. B M Chaudhary, the Range Forest Officer of Radhanpur district, this point was reiterated. He said "The fact that the natural conditions do not support any other vegetative forms and Prosopis fulfills the requirements of fodder, fuel along with providing income by means of production of charcoal, extraction of gum, etc. it is futile to discuss whether P. Juliflora is important or not. As no other vegetation grows in this area owing to the high salinity Prosopis provides a shelter belt from the hostility of the Rann."



On the issues of growing other species after removal of Prosopis an interesting thing came out. "Firstly growth of other salt resistant species like Piloo (Salvadora) or Saroo does not yield good results, besides in the lack of other sources of fodder; the cattle graze these

species causing high incidences of plant mortality. Protecting these species from animals will be very difficult."

Leaving aside the hypothetical, the fact of the matter is that most of the time the people who are dependant on the P. Juliflora are not allowed to use these trees by the forest department. In all the sampled villages of the four districts, the communities faced some problems in practicing the Charcoal trade owing to the unavailability of P. Juliflora. This unavailability was largely owing to the forest department's strict control over the Prosopis vegetation. The Forest department has its own reasons for doing so especially in the areas adjoining the Rann where the plant prevents further desertification. During the course of the study interesting changes in the legislation came about. The same is dealt in details in the Chapter 3 of Section 2.



3.0 Usefulness of Prosopis

Larger branches and trunks yield a high quality timber, comparable in color, finish and physical attributes to Indian rosewood and other commercial hardwoods. While also used for posts and poles, the wood, called 'wooden anthracite' in some areas, is almost unsurpassable as a fuel. Fruit pods are high in sugar and protein and are a rich food source especially for animals. In some parts of the world *honey* is extracted from the Prosopis and is considered of the highest quality and exudates gum which is comparable to gum Arabic.

The usefulness of *Prosopis juliflora* has long been recognized. It is considered to be a valuable tree species of the desert ecosystem. Its multiple-use possibilities have attracted growing interest in this species, especially in arid zone covering eight districts of the northwestern region of the Gujarat state. This arid zone occupies a geographical area of about 3,500,000 ha, of which, the Rann of Kutch covers a large portion. Here, *Prosopis juliflora* constitutes a large percentage of vegetative cover, extending over an area of about 500,000 ha. In this desert ecosystem, this species is one of the most efficient species to convert energy into biomass as a primary producer. **It produces about 20 to 30 tons/ha/year at the short rotation age of 4 to 5 years.** It is, therefore, necessary to improve the management of this natural resource through scientific and technical studies to obtain various raw materials in perpetuity for agro-industrial utilization.

The following forest products have been collected from different parts of the northwestern arid zone of Gujarat: pods, gum, and wood for charcoal production. *Prosopis* has also been used to combat desertification.

3.1 Pods collection for livestock feed

Prosopis juliflora trees have a tremendous potential for pod production. The pods are collected twice a year (winter and summer). The maximum pod production is between March and June. Because of the high carbohydrate content and good amount of protein, the spongy walls of ripe pods are highly nutritive and used in making meal for humans (Pinole) and alcoholic beverages (Mesquitabole, mesquite wines, etc.). The husk of pods is used for dying; they contain tannin (1.9%). The ripe pods are said to have high nutritive value, i.e., rich in sugar and nitrogen and are greedily eaten by most of the

Nutrient Content of the Pod

Protein, 16.5%; Fat, 4.2%; Carbohydrate, 57%; Fiber, 16.8%; Ash, 5.4%; Calcium, 0.33%; and Phosphorus, 0.44%. Moreover, Gujarat Agricultural University, Anand,, determined the trace-element composition of *Prosopis* pods as 12.46 to 15.51 ppm Copper, 22.11 to 22.30 ppm Manganese, 18.30 to 28.01 ppm Zinc, and 203 to 638.8 ppm Iron.

herbivorous animals and livestock. Further, the pods may yield a substitute for wood shavings used in various industries for thermal insulation and acoustic control. Studies on palatability and nutritive value of pods and their source as livestock feed and milk production, particularly goats, sheep, and camels, have been conducted by Gujarat Agricultural University, Anand *Prosopis* pods provided good fodder without causing any digestive adverse effect. For cattle and buffaloes, the pods were not regarded as good fodder because of the high sugar content and indigestibility of raw seeds. When fed in the dried and crushed state in the form of powder, the pods did not show any deleterious effect on cattle and, in fact, resulted in good animal performance. Further, 50% wheat and rice-straw, molasses and ground-nut cake can also be mixed with this powder to make it more nutritious, palatable, and valuable. This powder contains 13% glucose which can be utilized in making biscuits after adding to it 50% wheat fine flour. During drought and scarcity, the pods are even used as food items by poor people. To use *Prosopis juliflora* pods as a livestock feed, GSFDC has proposed a scheme for manufacture of livestock feed in Kutch district to take advantage of the quantities of pods that are available. The seeds were to be sold to the Forest Department and other agencies for raising plantations.

3.2 Gum production

Prosopis juliflora exudes gum from the sapwood. On an average, about 40 Gms. of gum is produced from one plant. However, under drought conditions more gum is exuded. During 1991-1992, the maximum production of more than 1000 metric tons was obtained. This compares to the normal yield of about of about 300 metric tons/year (GSFDC, Vadodara*s records). In the period from 92 - 97, the corporation collected about 2000 metric tons of gum and generated more than 1 million man-days of labour (approximately US$1 million).

The gum forms adhesive mucilage, with favourable physical and chemical properties, that can be used as an emulsifying agent. Prosopis gum also finds use in confectionery, mending pottery, and as an adulterant and substitute for gum Arabic. Owing to the high content of arabinose, which is easily separable, the gum has proved to be an excellent source of sugar. Moreover, the gum is used in industries. If additional utilization of this gum can be found, it would further enhance the value of this already economically important tree. Furthermore, the gum contains: D-galactose, 45%; L-arabinose, 24%; L-rhamnose, 13%; and glucuromic acid, 13.7%. It possesses fairly good adhesive strength and can be used as paper adhesive for brown paper and wallpaper. The gum has also been used in treating eye infections.

3.3 Honey collection

Prosopis juliflora flowers profusely twice a year and produces sweet nectar that gives excellent honey. In the period 92 – 97, about 300 metric tons of honey has been collected, processed, and marketed by GSFDC, which has generated about half million man-days of labour. *Prosopis* honey accounts for about 90% of the total production of the state in the Kutch district (GSFDC records). The honey is produced by a rare species of honeybee, *Apis floriea* that is found in large numbers in Kutch district due to its peculiar climatic and environmental conditions. The honey produced by *Apis floriea* is regarded as one of the best

quality of honey from the medicinal point of view, with an "A" grade by researchers at the Central Bee Research & Training Institute (CBRTI) in Pune. In view of the increasing honey demand, the corporation has proposed a scheme for honeybee rearing to increase honey production in the Kutch district. GSFDC honey enjoys high acceptability in the local market due to its purity and reasonable price. By rearing the domesticated variety of honeybee in selected areas of Kutch district, the production can be increased. In this new process, modern methods of extraction from combs will be applied using new technology developed by CBRTI. During purification of the honey, the wax is separated though filtration. In the last five years, about 15 metric tons of wax have been collected by GSFDC that has found good markets for creams, pain balms, and medicines.

3.4 Charcoal preparation

The wood is hard and heavy (specific gravity 0.70). It is excellent firewood (calorific value is 4800 kcal/kg) that burns slowly and evenly and holds heat well. Because of its superior quality, it is considered to be one of the best charcoals. Dry wood, on destructive distillation gives 33.9% charcoal, 1.24 methanol and 124.8 liter/kg of gas. *Prosopis* wood, together with rice husk and other agro-wastes, can be briquetted to form a good quality white coal. Other forms of charcoal can be used for household purposes. The pellets are prepared from twigs, powder from *Prosopis* pods, and charcoal waste particles. This mixture is bound together with a mixture of agro-wastes under specific temperature and pressure conditions. Briquettes are prepared from crushed green, dried (with supplemental heat) twigs that are mixed with *Prosopis*-pod powder, wooden chips and a binding material like rice husk and other agro-wastes. When hydraulic pressure is applied to this mixture, gum contained inside the wood chips comes out and mixes with the rice husk layer surrounding the wood chip. The resultant product is a briquette, in which Prosopis wood forms a core and rice husk forms an outside layer. These briquettes have better breathing action, and hence, better combustion characteristics than those of other types, and are used in furnaces. Charcoal-manufacturing activities have been carried out in remote and backward areas of the districts like Kutch, Banaskantha and Surendranagar.

3.5 Combating drought and desertification

Perhaps the most important reason why Prosopis has been tolerated and in fact had been introduced in Gujarat was the shelterbelt, which Prosopis was able to provide against the onslaught of the desert. The Nawab of Radhanpur is credited with bringing this species in Gujarat to prevent the desertification.

The entire northwestern zone of Gujarat is facing the grim prospect of drought and desertification. The villages bordering western Rajasthan and Rann of Kutch are the worst hit. The once fertile lands of these border areas have turned into barren wastelands. Over exploitation of ground water and vegetation, as well as mining activities, have resulted in a sharp increase in salinity levels. The soil thermal regime, frequencies of salt sprays, and change in rainfall patterns have affected the soil

moisture. Rapidly disappearing forest covers, lack of environmental consciousness among the people, accompanied by a blind race for rapid economic returns, have aggravated the situation in this zone.

All these factors have contributed to the relentless march of the desert. Additionally, the Aravali hills have also been eroded and denuded, due to over-grazing and other biotic pressures. To combat desertification and check drought, afforestation programmes have been carried out under different schemes, viz. Desert Development Programme, Afforestation on Desert Border, and Border Area Plantation. These schemes have created shelterbelts and windbreaks on the periphery of agricultural land and wasteland as well as barren and saline areas under forests. No doubt, due to its tolerance to refractory environmental conditions, after successful introduction, *Prosopis juliflora* has been spread extensively and given excellent results in plantation activities. The practice of nomadic pastoralism with free **grazing has stimulated the distribution of this species because the undigested, but treated seeds pass through the digestive system of the livestock and are disseminated by migratory animals.** This seed dispersal on vast areas has helped natural regeneration and naturalization of this species. Consequently, the desert is blooming and eroded, denuded Aravali Hills are also becoming green due to its fast growth and drought-hardy inherent capacity. Further, a 4 to 6-year-old stand of *Prosopis juliflora* has reclaimed salt affected soils by enriching them with 6 to 8 tons/ha of air-dry leaf litter containing sufficient quantities of both macro- and micro-nutrients (Forest Department records). Last, but not the least, the seed cakes of this tree species that have been sown on contour trenches and excavated soil of water-retaining structures, such as check dams across the desert lands, have produced significant results in creating green belts and windbreaks to check the rapidly spreading devil of desertification - a problem of international dimensions.

3.6 Energy and Nitrogen fixation

This species provides more than 90% of the fuel wood in some Indian villages. Although no direct data on N-fixation of Prosopis are available, some studies suggest that tree legumes fix between 155 and 580 kg/ha/yr. Soils under the crowns of legumes in the desert usually have 10 times more N (0.3%) than those under non nitrogen fixers (0–03%).

4.0 The negative Aspects of Prosopis

4.1 Toxicity

The thorn from mesquite, on penetrating the eye, causes more inflammation than expected from the physical injury. The irritation may be due to waxes. Injection of cerotic acid is destructive to the eye. (Still Amerindians applied the leaves for conjunctivitis.) Using the wood in a fireplace has caused dermatitis, as has working with seasoned wood. The gum has irritant properties. Reports on cattle toxicity vary. Lewis and Elvin-Lewis (1977) report that ingestion over long periods of time will result in death in cattle. Further, they report that the pollen may cause allergic rhinitis, bronchial asthma, and/or hypersensitivity pneumonitis. Kingsbury (1964) goes into some detail on mesquite poisoning in cattle, including cases where autopsies showed pods and seeds in the rumen 9 months after the cattle could have ingested them. Mesquite poisoning may induce a permanent impairment of the ability to digest cellulose. Felker and Bandurski (1979) also provide interesting detail. If Prosopis pods are the sole food source for cattle, 1% becomes sick, and some die with a compacted pod ball in the rumen. Death is attributed to high sugar content repressing the rumen-bacterial cellulose activity. Mesquite feeding to pigs was promising during the first four weeks, deteriorating thereafter, perhaps due to phytohemagglutinins and trypsin inhibition. Feeding trials with sheep show a 15% higher protein digestibility coefficient for mesquite pods than for alfalfa hay.

Fast growing, drought resistant, and with remarkable coppicing power, *Prosopis* is a natural fuel wood candidate. With specific gravity 0.70 or higher, the wood has been termed "wooden anthracite", because of its high heat content, burning slowly and evenly and holding heat well.

4.2 High Rates of Propagation

Along with the above-mentioned negative aspects of the properties of Prosopis, the major cause of concern has been the rapid rates of propagation, which has made Prosopis surpass Neem as the largest species in Gujarat. The specie is looked as a threat to Farm lands as they do not allow any other vegetation to grow, on talking to some villagers it also came out that the biomass specially the leaves of the tree get heated causing further degradation of the soil instead of manuring the soil. The roots spread very rapidly and are a threat to farming. The thorns have caused severe injuries to cattle as well as human beings.

The threat perception is so high that cutting of Prosopis has been on the agenda of state legislature. The recent Government Resolution removing restrictions on Charcoal from Non Forest Areas is to be understood as an option for removing Prosopis without costing the state exchequer. The newspaper articles show the immense importance that Prosopis enjoys in Gujarat as a threat. (Annexure - 5)

Chapter 3
Charcoal (*Kolsa*)

1.0 Introduction

Charcoal is produced in kilns via a form of pyrolysis. Pyrolysis is the breakdown of biomass in the absence of oxygen at temperatures above 250C. The process produces a solid (char or charcoal), a liquid (bio-oil) and a mixture of gases. The ratio of the products varies with the chemical composition of the biomass and the operating conditions. Efficiencies are generally low, but charcoal has advantages over fuel wood like easier distribution, high heat to weight ratio and more convenient. The oldest and probably still most widely used method for charcoal production is the earth kiln (earth pit kiln, earth mound kiln). Several other types of charcoal kilns have been developed, which generally have higher efficiencies but also require higher investments. In the area of our study the earth mound kiln is used for the production of charcoal, which is considered to be energy inefficient but owing to the low costs involved has a financial feasibility for the people who have very low investment capacities. The temperature reached in the production process has a marked influence on the composition and yield of the charcoal produced.

The making of charcoal, literally the distillation of wood to its carbon content, was an important process during the first half of the nineteenth century. Because it burnt hotter and cleaner, charcoal was considered superior to wood. It provided fuel for both the furnaces, which produced the iron and the forges of the blacksmiths who shaped it. The first person to discover the seemingly magical properties of charcoal has long since been lost to human memory. **What is known is that it may have been used in Europe as early as 5,500 years ago and was the "smelting fuel of the bronze and iron ages."**

2.0 The case for Charcoal

2.1 As Fuel source

Like firewood, charcoal can be purchased in the preferred quantity. But unlike firewood, it burns without smoke; does not decompose even after extended storage; does not create dangerous flames around vessels; and requires a simple stove whose heat output is relatively easy to control.

In the study area hardly any of the villagers used charcoal as a fuel as most of the time either wood was available in plenty and at a cheaper rate. Charcoal was largely produced for sale outside the village for commercial purposes rather than domestic purpose.

2.2 Affordability

Charcoal probably is easily accessible to householders in poor countries, since petroleum fuels (kerosene, LPG, natural gas) and electricity are likely to remain too expensive. When charcoal users switch to kerosene, they double their fuel expenditures, and this sum are at least doubled again when they switch to LPG or electricity. Costs of cooking equipment also increases dramatically with the comfort levels associated with modern fuels. Thus, unless disposable incomes increase considerably, which seems to be unlikely in the near future

specially in the rural areas, the attractiveness of the other modern fuel would be outshined by the high costs associated with it.

2.3 Source of Livelihood

Charcoal production has been a source of Livelihood for many poor families largely belonging to Koli community who have no other alternative source of Livelihood. Though for a majority of the primary stakeholders charcoal was a source of supplementary income especially in the regions receiving some amount of irrigation or having other alternatives in the form of salt work etc. a substantial number of people spend almost 6 to 8 months in a year subsisting on this occupation. For the Parakara Kolis with a population of about 5,000 persons residing in the Waghad region of Kutch district, charcoal making is largely the only occupation that helps them earn their livelihood.

The gravity of the situation can be understood by the findings of the study as well as previous studies that suggest that production of charcoal is considered only as a last alternative in the absence of any other form of labour. Despite this there is a substantial amount of production of charcoal that suggest that dismissing charcoal production for whatever reason can never be a realistic decision.

3.0 The case against Charcoal

3.1 Inefficient Fuel

Charcoal is a very inefficient fuel to produce. It does not make much sense to waste energy, not even if it is traditional, indigenous, and renewable. Evaluation of hundreds of traditional kilns in Madagascar and Rwanda showed charcoaling efficiencies of only about 8 to 9%. In several countries, higher production efficiencies of 8 to 20% have been reported. The very low efficiencies obtained in practice can be increased considerably through a systematic effort to help charcoal producers become more professional; efficiencies of up to 28% have been observed in practice.

In the study areas the efficiency ratio ranges from 20 to 30 percent depending upon the process followed by the producers. The efficiency also depends on the usage of raw material and the part of the Prosopis plant that is used. The usage of tree roots yields more Charcoal rather than use of stumps and branches.

3.2 Carbon – di – oxide (CO_2) emissions

Since the burning characteristics of charcoal and mineral coal are very similar, use of charcoal results in high volumes of CO_2 emissions, as well as of CO and CH_4 (but not SO_2). However, if charcoal were produced on a sustainable basis (without causing deforestation), it would be neutral to the carbon cycle; the burning of charcoal would simply release timescale CO2 back into the air.

3.3 No Market Incentives

Environmentalists feel that charcoal production should be stopped altogether because of its destructive nature as presently practiced. However, urban dwellers in some developing countries have a strong appetite for charcoal, and attempts to ban the production or the use of charcoal have been mostly unsuccessful mainly due to the interplay of commercial interests. Since operators can use free raw materials (wood from natural forests or clear felling) and turn them into a marketable commodity in high demand, they do not have much respect for the sustainability of the resource.

3.4 Institutional Inadequacies

Wood fuels - and thus also charcoal - fall between the organizational cracks. Frequently very little coordination and collaboration are evident between energy and forestry ministries since, energy ministries are more concerned with electrification and the supplies of

petroleum products, and forestry ministries are more concerned with the production of wood in industrial plantations and conservation of wood resources in natural forests. In general, developing countries lack the organizational capacity to formulate effective regulations for wood fuels or even to apply the existing inadequate rules to improve the functioning of the wood fuel market chain. Arbitrary interventions in the wood fuel sector have resulted neither in effective regulation nor in control of the sector. This is very much relevant in the case of charcoal where by virtue of charcoal being listed under NTFP in the Indian Forest Act 1927 falls under the jurisdiction of the Forest Department however in many areas where Prosopis grows in the non forest areas and is a threat to the farm and the pasture lands the place of production falls under the purview of the Revenue department and the Panchayat. There have been several changes in the regulation regarding the permit raj, which dominated the charcoal trade and has been recently amended.

In case of the study area *Prosopis* is used for making Charcoal. Removal of Prosopis has been a topic of debate with some lack of clarity regarding the intent of the Government. Recent regulations seem to be in support of removal of Prosopis, which would help in removal of restrictions on production of charcoal. However whether such regulations would fulfill the purpose of reduction of Prosopis and how rational the decision of removal of Prosopis is especially in the areas facing the threat of desertification is a topic of debate which is beyond the scope of this study.

3.5 Transformation Efficiency

Improved kilns do not require a large capital outlay; they simply require better understanding and control of the carbonization process. Drying of wood, better stacking methods, and better process control, in combination with a chimney to force inverted draft, can increase carbonization efficiency substantially. This has been seen in the study area where the traditional charcoal makers belonging to Koli communities of Banaskantha, and the Waghad Region have a higher efficiency ratio. However, some charcoal makers are reluctant to pursue these improvements since it takes more time and effort to prepare the kiln and control the carbonization process; where the wood is basically free, the charcoal maker is better off poorly preparing several traditional kilns in quick succession. Increasing the efficiency of carbonization thus requires regulatory measures, systematic training, and demonstration programs for traditional charcoal makers at their habitual work sites.

A simple Arithmetic

In order to get a glimpse of what the primary stakeholders think of the transformation efficiencies the team decided to compare the process between the charcoal workers where the efficiency ration was 30 percent and the less efficient process where the efficiency ratio is 25 percent.

Case 1

Use of better carbonization practices require 3 to 4 days of Pyrolysis for about 20 sacks (each of 35 to 40 Kg at 30 % efficiency). The proper drying and stacking takes another 4 to 5 days other than the 12 days of hard work in cutting the Prosopis. Another 2 days go into the breaking and cooling of the Charcoal Kiln, the total cycle therefore is a minimum of 21 days at the end of which the producer will get Rs 1000 @ Rs 50 per sack. On the other hand the less efficient method would produce about 16 sacks of Charcoal in 16 days time that would yield Rs 800. **The point to be noted here is that the pricing of charcoal at the Producer to the trader level is not on Quality basis but on Quantity basis alone**. As such the producer who is less efficient is able to get two cycles of production in a month giving him higher returns than the more efficient producer!

Another aspect that has to be appreciated if we discount the need of efficiency owing to the ecological aspects alone is the higher risk of burning associated with higher number of days for Pyrolysis and the hardships associated with it.

4.0 Consumers of Charcoal[2]

4.1 Laundry units

A large number of laundry units use charcoal for ironing clothes. Most families wash clothes at home and get them ironed by small laundry units located near their residences. Most of the laundry units use charcoal in their irons. Laundrymen conservatively estimate 2 kg. as a reasonable daily amount of charcoal for a full day's operation because the workload is not heavy on all days in a year. Assuming that these units work for about 300 days in a year, annual consumption of charcoal for a laundry unit comes to around 600 kg.

4.2 Lead extracting

Lead extraction is another small scale unorganized industry, which uses charcoal as fuel. Substitutes for charcoal are not suitable given the nature of processing. Owners of kilns (bhatti) purchase discarded automobile batteries and smelt them to extract lead. Diesel operated blowers constantly fan the burning charcoal to keep the temperature high. Initial processing of the discarded batteries requires about 6 bags (240 kg.) of charcoal. A second processing of the initially processed material requires another 4 bags (160 kg.) of charcoal. Taking the average daily consumption / kiln as 5 bags, and assuming 300 operating days, annual consumption for this sector works out to about 45,000 bags or 1,800 metric ton.

4.3 Metal processing

There are not many metal processing units in Ahmedabad. However, a few manganese-processing units use sizable quantities of charcoal. Metallic ore is mixed in alternate layers with charcoal and heated in a furnace to extract the metal. Daily consumption of charcoal varies from 60 to 70 bags, and is used mainly for heating the raw material for further processing. Charcoal users in this industry are particular about the quality of charcoal. Impurities are perceived to affect the output. Charcoal is screened and cleaned upon arrival. The price is fixed on a 100 MT basis. This means that once a price is negotiated, it is valid till the supply of 100 MT is completed. At least one truckload of charcoal is supplied every week. Price includes delivery at the factory gate.

4.4 Dhania dal (coriander seeds) processing

Dhania dal or coriander seeds are taken after meals, snacks, or tea as a mouth freshener. The moist seeds are put in an electrically operated mill to separate the husk and split the seed. The seeds are roasted and marketed. Medium sized charcoal stoves are used for roasting. Two electrically powered blades rotate at slow speed to roast the dal uniformly without burning it. A unit of eight stoves working for six hours consumes roughly two bags of charcoal. Production is seasonal and the units generally operate for 180 to 200 days in a year. But the users are not quality conscious. Ungraded charcoal is generally supplied and accepted without any resistance. It is possible to use gas or kerosene for roasting operations. However, most of the workers are scared of the accidents that could result from using these fuels. Hard coal is not used because it gives out intense heat and burns the roasting pans.

4.5 Agarbatti (incense) manufacturing

Next to Karnataka, Ahmedabad is emerging as a large incense-manufacturing center, giving employment to around 3,00,000 middle to lower middle class housewives. There are two types of incense sticks: oil-based and water-based. The oil-based incense known, as Darbar Agarbatti is generally slow burning and one stick could last up to 45 minutes. One kilogram of this incense normally requires 200 to 250 grams of finely grounded charcoal dust. The water-based incense stick, on the other hand, burns for 20 minutes and consumes about

---

[2] FAO 1993 Regional wood energy development programme in Asia food and agriculture organization of the united nations, Bangkok, gcp/ras/154/net-1993

500 grams of charcoal dust / kilogram of incense. Charcoal dust is used to keep the fire going. Therefore, charcoal dust must be of extremely good quality and foreign matter must not exceed one per cent. Hard coal dust is not used in incense manufacturing because the sticks do not burn properly.

4.6 Food vendors (Road side - Dhabas)

Roadside catering units are another important group of charcoal users. Though their number is not very large, they are concentrated in those areas where business is brisk. Most units use charcoal as a fuel. Kerosene is as expensive as charcoal; however, charcoal provides uniform and prolonged heat, which is essential for preparing several food items. Kerosene stove either burns the vegetables or leaves some portion half-cooked. Some of the units have switched over to gas (although, this is not permitted), but it is not economical. Hard coal takes long time to ignite. Since the business is not continuous and service has to be quick, charcoal is preferred. Each stove requires around 2-2.5 kg. of charcoal. Vendors generally buy one bag of charcoal, which lasts about a week. The charcoal depot owner takes orders in the evening and delivers charcoal next morning by cycle rickshaw.

4.7 Industry-Ceramic, Calcium Carbide, Calcium Carbonate

Calcium carbonate is used as filler in toothpaste, medicines, PVC pipes, leather goods, rubber products and even specialized clothes. The ceramic Industry in Morbi has come out as a major consumer for the charcoal. In fact these industries have led to the decline in the Asarva market of Ahmedabad as now a major portion of the charcoal produced in Kutch, Surendranagar, Patan and Rajkot is consumed within Morbi.

Table 3: User Preferences

Consumers	Quality Consciousness	Remarks
Laundry	Somewhat conscious	Chips and fines not liked, impurities give sparks and damage clothes
Briquette Makers (local)	Not conscious	Use mostly the leftover charcoal fines
Lead Extractors (local)	Not conscious	Fines, chips, and good quality charcoal are all mixed in the furnace
Metal Processing (local)	Highly conscious	Impurities affect the output
Coriander Seeds Processing (local)	Not conscious	Used only for heating
Incense Manufacturers (local)	Highly conscious	No more than 1% of dust particles is tolerated, otherwise the incense would not burn properly
Food Vendors	Not conscious	Small quantity mostly used for heating
Calcium* Carbonate Industry	Somewhat Conscious	Concerned with calorific value
Calcium Carbide*/Ceramic Industry	Highly conscious	Used for chemical processing

5.0 Quality of Charcoal

Charcoal quality is determined by the raw material used, the carbonization process and the part of the tree used for the process. The weight of charcoal and the size of the pieces determine the quality of the charcoal. The charcoal produced from the Prosopis is considered the best charcoal as the smoke produced is the least and the burning is slow. While procuring charcoal from the producers, quantity rather than the quality, is looked into by the trader. However indirectly the quality aspects get built into the procurement process as the trader discounts some weight as waste and gives lesser amount to the producer. In one of the sites the trader used to cut 2 Kg from each bag as a cushion against waste materials.

When the trader sells the produce to the commission agent or the industries samples are taken from each truck to determine the waste materials in the sack and the price is paid accordingly. In Asarva market this is followed more stringently as compared to Morbi market and has been one of the reasons for reduced attractiveness for traders.

6.0 Markets in Gujarat

The Asarva market in Ahmedabad is one of its kinds in Asia, which is exclusively dealing with charcoal. The product coming from various parts of Gujarat as well as other parts of the country are traded through commission agents.

Another upcoming market, which has gained more importance especially for the producers and traders of the areas of our study, is Morbi market. The reason can be attributed to the nearness of the market and the ceramic industry that has very high demand for charcoal.

7.0 Charcoal production – Global Scenario

Unit: 1000 CUM

	Country	1991	1998	1999	2000	2001	Decadal Growth (%)
DEVELOPING COUNTRIES							
	SOUTHEAST ASIA						
1.	Cambodia	11 176.5	10 520.5	10 315.6	10 119.4	9 924.3	-1.2
2.	Indonesia	120 775.6	91 892.0	90 417.0	88 981.1	85 712.1	-3.3
3.	Lao PDR	5 679.1	5 814.6	5 842.8	5 872.0	5 885.0	0.4
4.	Malaysia	3 930.7	3 413.6	3 381.9	3 345.7	3 285.5	-1.8
5.	Myanmar	17 501.0	32 150.0	34 223.0	34 471.0	35 403.0	9.4
6.	Philippines	15 063.1	39 156.0	40 011.0	40 950.0	41 699.0	14.7
7.	Thailand	21 629.0	20 548.8	20 547.6	20 552.5	20 396.3	-0.6
8.	Viet Nam	26 708.4	26 707.0	26 695.3	26 685.6	26 615.2	-0.1
	SOUTH ASIA						
9.	Bangladesh	27 875.8	27 851.0	27 842.9	27 835.9	27798.7	0.0
10.	Bhutan	3 869.7	4 065.7	4 142.5	4 220.8	4 283.7	1.1
11.	India	281 734.0	277 380.0	277 380.0	277380.0	27780.0	-0.4
12.	Nepal	12 346.4	12 593.5	12 678.5	12 762.7	12 744.2	0.3
13.	Pakistan	21 370.0	29 515.0	30 670.0	30 880.0	30 553.0	4.7
14.	Sri Lanka	9 226.0	6 004.5	5 955.2	5 906.6	5 839.9	-5.9
	CENTRAL ASIA						
15.	Kazakhstan		.0	.0	.0	.0	-6.6
16.	Uzbekistan		24.3	19.0	19.0	19.0	-7.1
	OTHER ASIA						
17.	China	192 341.8	191 052.5	191 051.6	19150.8	191049.0	-0.4
18.	D.P.R. Korea	4 482.9	5 356.4	5 429.3	5 502.9	5 561.0	2.2
19.	Iran (Islamic Rep. of)	363.0	227.0	189.0	54.0	263.9	-10.2
20.	Mongolia	263.0	186.0	186.0	186.0	186.0	-3.8
21.	Rep. of Korea	2 662.5	2 438.3	2 444.1	2 449.2	2 453.8	-0.8
	PACIFIC ISLANDS						
22.	Fiji Islands	37.0	37.0	37.0	37.0	37.0	0.0
23.	Papua New Guinea	5 533.0	5 533.0	5 533.0	5 533.0	5 533.0	0.0
24.	Samoa	70.0	70.0	70.0	70.0	70.0	0.0
25.	Solomon Islands	138.0	138.0	138.0	138.0	138.0	0.0
26.	Vanuatu	24.0	24.0	91.0	91.0	91.0	15.7
	SUB-TOTAL	784 800.4	792 698.6	795 291.1	79594.1	79221.9	0.2
DEVELOPED COUNTRIES							
27.	Australia	3 786.5	5 636.9	5 974.4	6 332.8	6 707.3	5.9
28.	Japan	168.0	264.0	308.0	133.6	128.5	2.6
29.	New Zealand	50.0	.0	.0	.0	.0	
	SUB-TOTAL	4 004.5	5 900.9	6 282.4	6 466.4	6 835.8	5.7
ASIA & PACIFIC		788 804.9	798 599.5	801 573.5	801 60.6	799 57.7	0.2
REST OF WORLD		926 247.4	927 187.9	969 729.1	989 181.2	989 748.9	0.7
WORLD		1 715 052.0	1 725 787.0	1 771 303.0	1790742.0	1789506.0	0.5

Source: Selected indicators of food and agriculture development in Asia-Pacific region ...FAO Corporate Documentary Repository

Section 2
Study

Chapter 1
Findings of the Study

The study concentrates on four districts of Gujarat, which have a substantial number of charcoal producers. The emphasis is on the charcoal workers and accordingly the study has been designed to cover various aspects related to their well being.

1.0 Focus of Study

The study has focused on a holistic approach to improvement in the living standards of the workers engaged in the trade. Each step will be looked into through the following 5 aspects of:

- Economic
- Health
- Educational
- Gender
- Legal

2.0 Stakeholder Identification

In order to understand the possible areas of intervention covering above-mentioned aspects it is necessary that the whole process be clearly understood and the critical points of exploitation be plugged to improve upon the livelihood situation of the charcoal workers. This necessitated clarification about the roles of the various players in the whole trade. This section looks into the value chain, the various stakeholders and their relative importance in the whole chain. The study classifies two sets of the stakeholders. The players who are direct beneficiaries and ironically the direct sufferers have been classified as the primary stakeholders. The secondary stakeholders are those who play an important and some times detrimental role for the primary stakeholders. This section substantiates the various findings using the sample survey and attempts to arrive at a birds eye view of the charcoal trade and the critical points of possible intervention based on which the recommendations have been made.

Primary Stakeholders

- Charcoal Workers
- Family Members
- Traders

Secondary Stakeholders

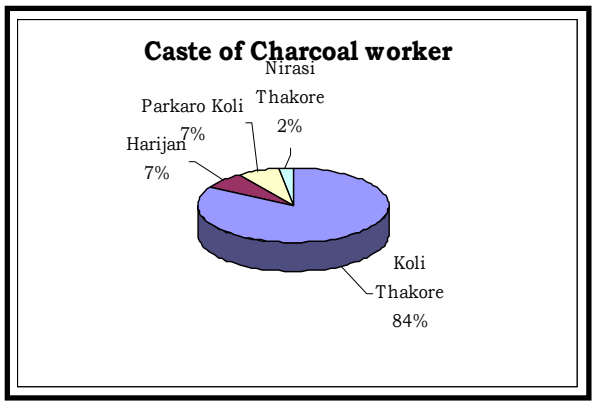
- Forest Department
- Panchayat
- Other Departments

2.1 Primary Stakeholders

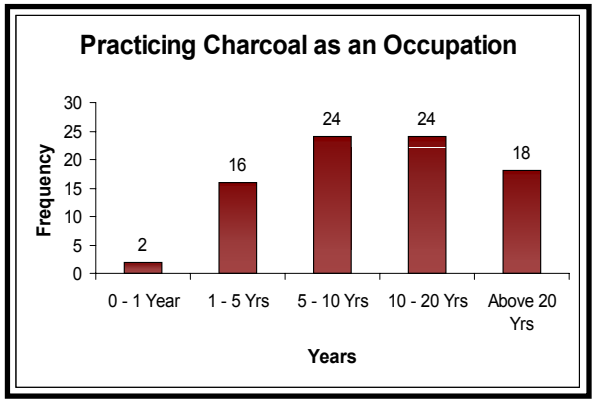
The sampling was done to cover a large geographical area, which have slightly different socio cultural and economic background. Areas that are relatively beter off in terms of the availability of irrigation facilities have also been taken to understand the plight of the charcoal workers and the significance of this trade in their lives. At the same time communities, which have no other alternatives like the Parakara Kolis of the Waghad region have specially been studied, as they are one community, which have traditionally been associated with the trade. Largely the trade is associated with the Kolis of the region and the study too substantiates this fact, though there are some exceptions in the form of Harijans also undertaking this trade.

2.1.1 Social Status

The charcoal workers largely belong to the Koli communities in the areas of our study. Among the Koli the Desi Koli and the Parakara Koli form the largest community involved in the Charcoal trade. The Nirasi Thakore[3], Koli Thakore and the Parakara Koli all belong to the Koli community. There were some scattered cases of Harizans undertaking the charcoal trade but these are usually exceptional cases. The team could not come across other communities undertaking the production work though other communities were involved in collection and sale of charcoal. In Karjada Village of Maliya Taluka, Rajkot there was some Muslims who undertook the work. 10 years before the workers did produce charcoal in the village but due to the reduced Prosopis this trade has become unviable in the village. The workers migrated to Banni and Rapar areas for Charcoal work.



The Kolis belong to one of the most backward communities in Gujarat. It is not to say that there is homogeneity among the Kolis themselves. There are hierarchies in the Koli community with the Desi Kolis being the higher ups and the Parakara Kolis[4] being looked down upon by the Desi Kolis. The Nirasi Kolis owing to their refugee status and the perceived fear of them, they were given land outside the main village. Their settlements are separate form the other villages and even to this day are looked suspiciously by the other villagers.



The team did come across some Harijans who are not traditional charcoal workers. They undertake this activity only when they are unable to get another work either as a farm hand or manual work in towns.

One of the aspects that need to be emphasized here is that **Charcoal Production is perceived as one of the most difficult economic activities in the areas where we conducted the study.** The type of physical labour that is associated with the production process has made it less lucrative for other communities to enter into the same. It is therefore largely the communities that have been traditionally doing this type of work who have a larger number. Kolis being traditionally known for the fiercely independent nature and physical tenacity are therefore the main Charcoal Producing community.

These communities are largely looked down upon by the higher castes. In most of the villages having a mixed population the Kolis lived in a separate hamlet in the village, which obviously had lesser amenities than the other areas.

---

[3] *Nirasi Thakores are the refugees who had come from Pakistan and usually stay in separate hamlets. The team could meet the community in Rofu Village of Sami Taluka, Patan District.*

[4] *Parakara Kolis are more or less confined to the Waghad region –Rapar and Bhachau talukas and can be considered to be among one of the most backward communities in the region. A study by Gram Swaraj Sangh estimates the total number of Parakara Kolis to be 5,000.*

2.1.2 Educational Issues

Education or literacy does not come in the priority of the people who are far more concerned with subsistence. This is compounded by the fact that a child irrespective of his or her age starts being used as a productive asset from the time he/she becomes capable of physical work. The need for provision of education gets blurred if not totally lost to these workers who had faced similar plight during their childhood days. 12 of the 84 respondents were literate among the sample that is an indication of the condition of literacy among the workers. As far as their children are concerned 57 % of them did send their children to school as long as the school was in nearby vicinity. But as soon as the child became old enough for work (read as physically capable) it joined the occupation of the family.

During the course of study we came across 24 families who were forced to withdraw their children from school either due to migration or economic reasons. In case of migrant population the situation becomes all the more difficult. Due to lack of facilities as well as lack of awareness these charcoal producers are unable to get their children admitted to the schools where they migrate. The education situation is worse among the Parakara Kolis whose mainstay is physical labour and largely involved in charcoal making.

Accessibility to school comes out as a major bottleneck for the children of charcoal workers. There is a need to find out creative solutions of classrooms going to the children rather than the children leaving the classrooms due to lack of accessibility and the rigidity of following the formal schooling.

District wise sample Findings

District	Literacy
Patan	13%
Surendranagar	18%
Rajkot	0%
Kutch	15%
Overall	14%

2.1.3 Gender Issues

In a society which largely suffers from the worst forms of poverty discrimination or exploitation of the women are not too obvious as the whole family is the sufferer and bifurcating impact of poverty for women and men seem a difficult task as both have different ways of coping up with it.

Women are equal partners in the hardships of the trade and play important role in the whole production cycle. This however does not mean that there are no gender related issues in such a community. Women traditionally have been also burdened with fulfilling the food and water needs of the households and taking care of the children and animals, which is also true for the women belonging to the charcoal producing communities. The situation is aggravated by the fact that the women here not only undertake heavy physical labour in the production process but also has to fulfill her other “duties”. The lack of proper nutrition for her and the children, lack of Reproductive and Child health facilities, the women has silently suffered extremely hostile conditions. The issues of women belonging to the charcoal communities are aggravated by the physical hardships that they suffer.

The question of the role of women in decision-making is nullified by the fact that there are no choices for decision-making. Charcoal making is largely a subsistence decision and despite of knowing the hardships both the men and women are involved in it. The men do the dealing with the trader and the money usually goes to the men.

Role in the production Cycle

The role of women starts from the time of chopping of the wood into small parts and making the kiln. During the process of Pyrolysis the whole family is involved and especially if it is

husband wife team the women has to take the dual responsibility of arranging food as well as supporting her husband. In 96 % percent of the cases the women were involved in the production process. Even among the migrant workers more than 40 % charcoal workers took their wives and the whole family with them. Only in 4 % of the cases the wives were not involved in the charcoal trade.

2.1.4 Economic Status

Socially these communities have been perceived as backward and as is true with the rural scenario in any part of the country are subject to immense suppression and exploitation. Economically the charcoal workers are those who usually have no other asset base to earn their own livelihood. Even those who have land are unable to cultivate their own land due to the investment requirements for undertaking agriculture.

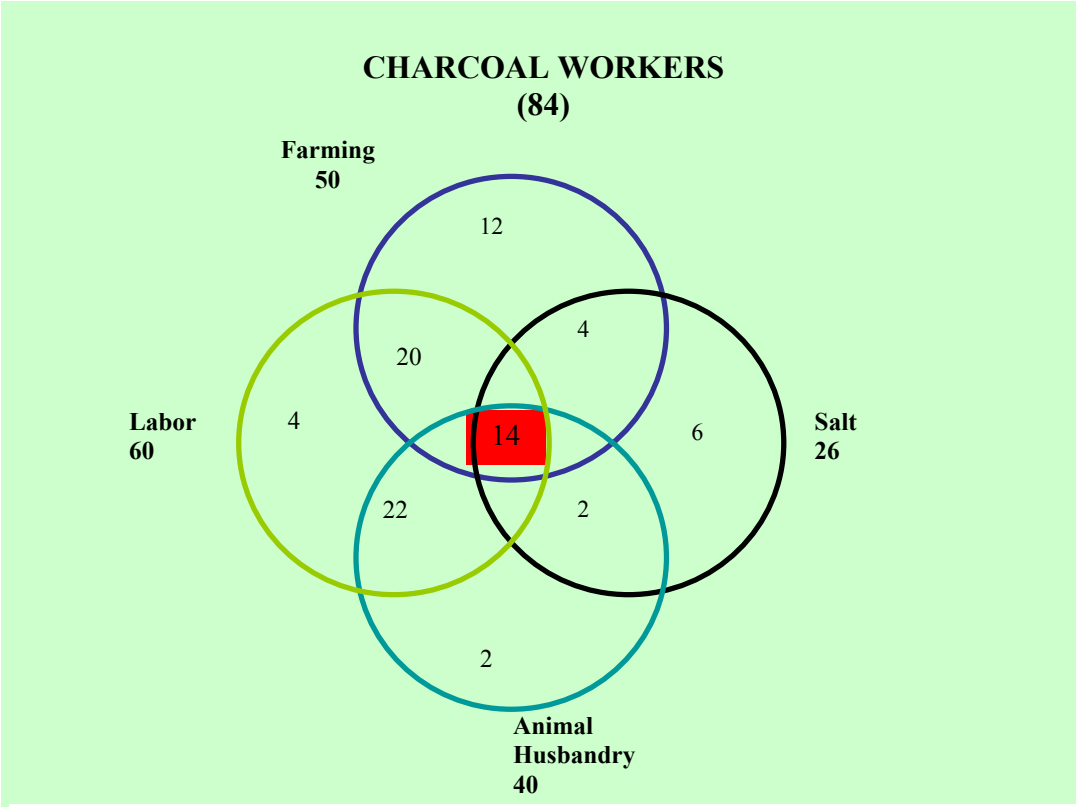


Figure 2: Various Occupations of Charcoal Workers

70 % of the charcoal workers are also agriculture workers who are able to get work during the monsoon season. As this is also the time when charcoal cannot be produced in most of the areas, most of the migrant population also comes back to their villages and are able to get employed.

50 percent of the sample had some land holding but only 15 percent could avail of irrigation facilities. Even for these families agriculture is not able to provide enough for subsistence. There are 5% of the sampled workers who also undertook agriculture in parts where they provided the labour and investments on someone else's land and the revenue was shared after deducting costs. However this is not a common practice of the charcoal workers and such a practice was only present in one of the sampled villages. 30% of the charcoal workers also undertook salt work, another occupation demanding immense physical labour. Some of the charcoal workers specially the non-migrating workers did keep milk animals however only one village of Tikar among the sampled villages practice it as an economic activity. Others usually keep goats as it is easy to maintain and provides the milk necessary for the daily use in far-flung sites where nothing can be found.

District wise Findings

District	Agriculture	Animal Husbandry	Salt	Labour
Patan	73%	46% (20% cattle)	66%	80%
Surendranagar	63%	36%	9%	45%
Rajkot	100 % (in parts)	100% (Goats only)	0%	100%
Kutch	30%	53% (Goats only)	15%	76%

3.0 Significance of Charcoal

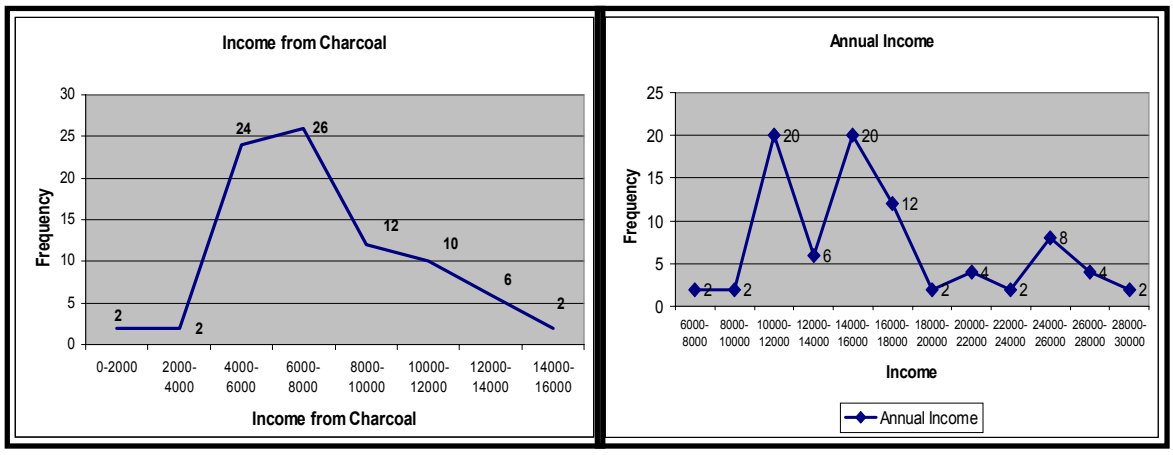


Figure 4: Dependence of Households on Charcoal Income

During the course of our study we came across three sets of people who were undertaking the Charcoal Work.

- The people who had no alternative.
- The people who took it as a supplementary source of income.
- People whose attitude supported the type of freedom that Charcoal Work provided.

Charcoal work is not only associated with very high amount of physical labour but also with various risk factors including injures and risk of complete burning which would completely destroy the produce. These factors make Charcoal a less lucrative occupation for mot of the sampled units. This perhaps explains why few new entrants in the trade while a majority have been doing the trade for a long time.

The first is the lack of any other opportunities. The area of our study falls under the arid to semi arid regions that are largely rain fed. The availability of agricultural labour is therefore limited. In the absence of any other skills the production of charcoal provides the much needed livelihood option. The second factor has more to do with the attitudinal aspects of some of the workers. The type of freedom in terms of the working hours and the ownership of the produce are not present in other alternatives like agricultural labour work where the owner determines the wages as well as the working hours.

In 52 % of the cases the workers preferred charcoal making while in the remaining 48%, charcoal work was seen as a compulsion that needed to be followed to sustain their lives.

3.1 Dependence on Charcoal (per family)

The study attempted to compare the relative importance of charcoal making in the livelihoods of the workers. The assumption was that besides charcoal making there are other livelihood avenues that are seasonal and are practiced by the workers. The annual income ranged from Rs 8,000 to Rs 28,000 per annum. The income from charcoal making ranged from Rs 4,000 to Rs 13,000. In 9 % of the cases charcoal making formed more than

80% of the total annual income. In 40 % of the cases the dependence was more than 50% while in 59 % of the cases the dependence was less than 50%.

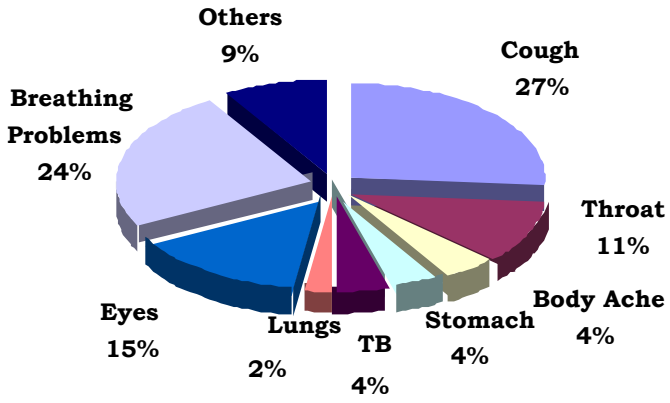
District wise Dependence (family)

District	Average Annual Income	Income from Charcoal	Dependence
Patan	15,027	6,877	46%
Surendranagar	15,467	5,685	36%
Rajkot	21,666	8,334	38%
Kutch	16,197	8,855	54%

4.0 Health issues

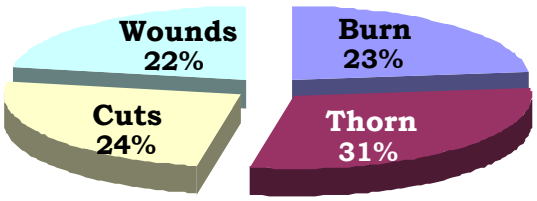
Health like education and nutrition is another casualty of poverty. The sufferings due to health related problems get ignored due to the immediate need of arranging for food. Preventive care is never a priority and the result is huge debts that arise while undertaking curative care. The present however is more important than the future and despite of understanding the significance of preventive care, it takes a back seat. The unavailability or untimely availability is another factor to be blamed for this indifference towards preventive health. Lack of awareness and the subsequent downplaying of the health issues could be observed among the workers. Problems like coughing, stomach pains etc. which many a times snowball into a major health problem are overlooked.

Another aspect related to the occupational hazard with which the charcoal worker has to deal with. Accidents, burns, cuts, bruises are common hazards that the workers face.



Thorns of Prosopis are known for its long lasting inflammation which it leaves even after being taken out, absence of first aid at the site and overlooking of small cuts turn out to be painful and disturbs the production cycle. 90% of the sample had been injured in one-way or the other. Out of these injuries due to thorns are the most common. The wound takes a lot of time in healing as the thorns are covered with wax that causes the wound to swell.

Besides the physical injuries caused while undertaking the production there are internal problems which have a slow but prolonged effect causing immense damage to the productivity and subsequently the sustenance of the family. The ignorance and lack of proper medical care leads to aggravation of problems. In only 30 % of the cases the workers went to the doctors. Most of the time they either follow the local remedy or ignore the disease.



Chapter 2
Value Chain of Charcoal Production

1.0 Introduction

This chapter gives a detailed step-by-step process of the Charcoal Trade as practiced in the study areas. Each step is examined in details and the **critical control points or probable intervention points** can be arrived at after looking at the steps. Below is a diagrammatic representation of the whole process as practiced in the study areas.

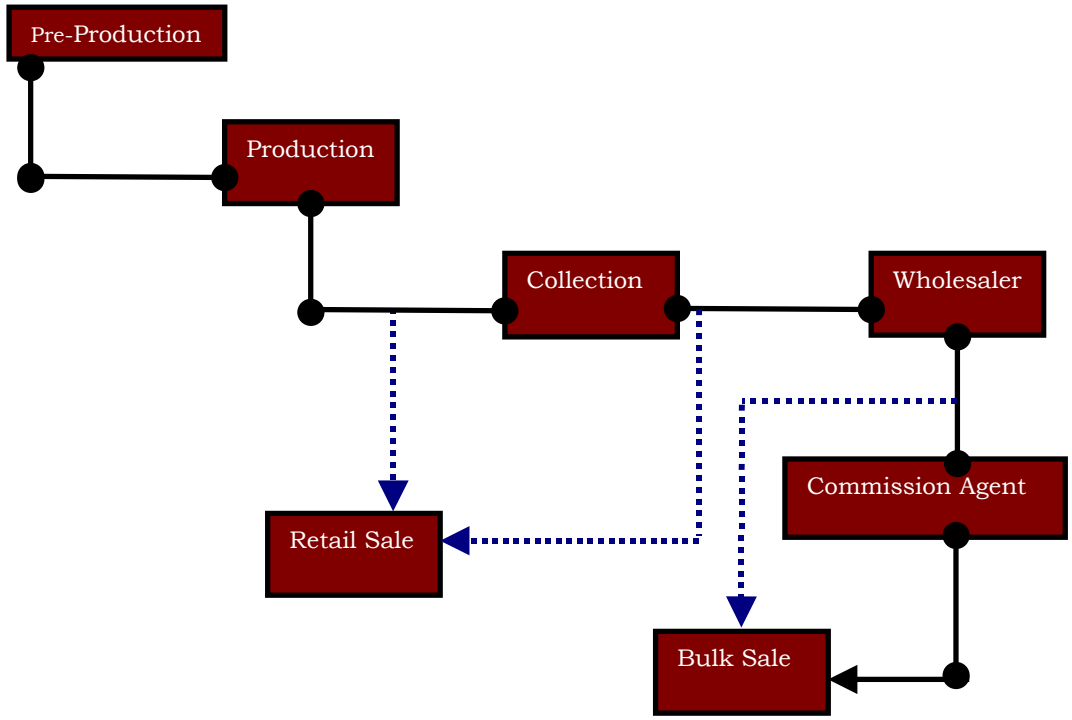


Figure 2: General Process

The pre production process involves getting permits, transportation of labour to the sites, selection of the site etc. depending upon where the charcoal is produced and who is the owner. There are two probable scenarios in the whole chain of Charcoal Trade, which have further variances. At each step there are issues, which could be tackled and looked into for improvement in the lives of the primary stakeholders. The choice of the scenarios by the workers is a mix of several variables as it came out in the study. Interestingly **Attitude of the Worker especially towards freedom** of practicing their own trade has emerged as one of the factors. The other factors include **perceived difficulties** in the trade, **lack of risk taking capacity**, **corrupt practices,** the **strong existing lobby** and **monopoly of the trader.**

2.0 Scenario 1

The producer works independently irrespective of any Obligation

In this situation the producer along with his family usually works in the village pasture land or private land after taking permission from the landowner. The boundaries of the farmlands or roadside locations are also used for the purpose. He prepares the charcoal and is contacted by either the Charcoal Collector or the trader. Hypothetically this provides more freedom to the worker in terms of economic decision taking regarding whom to sell,

but the fact of the matter is that this freedom is only a mirage as the economic freedom is either curtailed by monopoly of the buyer or by the extremely low sustaining power of the worker which forces distress sale.

In this case the activity is pursued in a very localized manner and the workers do not bother about taking permits, as they know that they are not going to transport the charcoal to the market. However, in such a scenario the workers face threats from the Government officials who may find it objectionable to cut Prosopis to produce charcoal. There have been cases of harassment especially in villages near the forestland by the forest officers, on the ground that the workers were cutting the Prosopis from the forestland.

Case 1
The producer takes permission from the owner of the Private Land to cut the Prosopis.
In some areas the producer pays money to the owner to use the land while in some it is done free. There is no general trend and such a practice varies from one region to other. It is also determined by the relations, which the producer has with the owner and the interest of the owner in removal of Prosopis. The main purpose of allowing cutting / removal of Prosopis from private land is for land cleaning. As such the producer has to remove the Prosopis from the root and in addition even remove small Prosopis from the land, which is of no use to him. This calls for extra labour for which he does not receive anything. After clearing the land and making the charcoal, he either sells some part in retail as was the case in Rapar, or informs some collector regarding his produce. The collector weighs the sacks and pays the price of the charcoal in cash. The weight of the sack ranges from 35 to 40 Kg, however the collector or the trader usually deducts 1 to 2 Kg from each sack to discount for the low quality charcoal, chips etc.

Case 2
The Charcoal worker cuts Prosopis from the Panchayat Land, Roadside or Wasteland
In the areas of study where individuals undertook this trade where there was no written permission taken from the Panchayat. These workers after looking at the suitability of the site undertook the preparation of charcoal. In such a case there have been cases of harassment from Police (they have no jurisdiction!) and the forest (if it lies within 1 mile of the forest area). The workers in this case either tried to hide the kiln with a cover or went deep inside the Prosopis vegetation to avoid being seen. In some villages where there is considerable number of charcoal workers and there is space within the village near their house, the workers bring the Prosopis wood and prepare their Kiln in the vicinity of their house.

In Moti Rav we came across a family which was cutting Prosopis and had covered the area with twigs and branches of the Prosopis. The first hypothesis of the team was that it was made to reduce the impact of winds, but on talking to the family it was revealed that this was done to avoid any unwanted guests who may come after looking at the Kiln! - (Photograph Above)

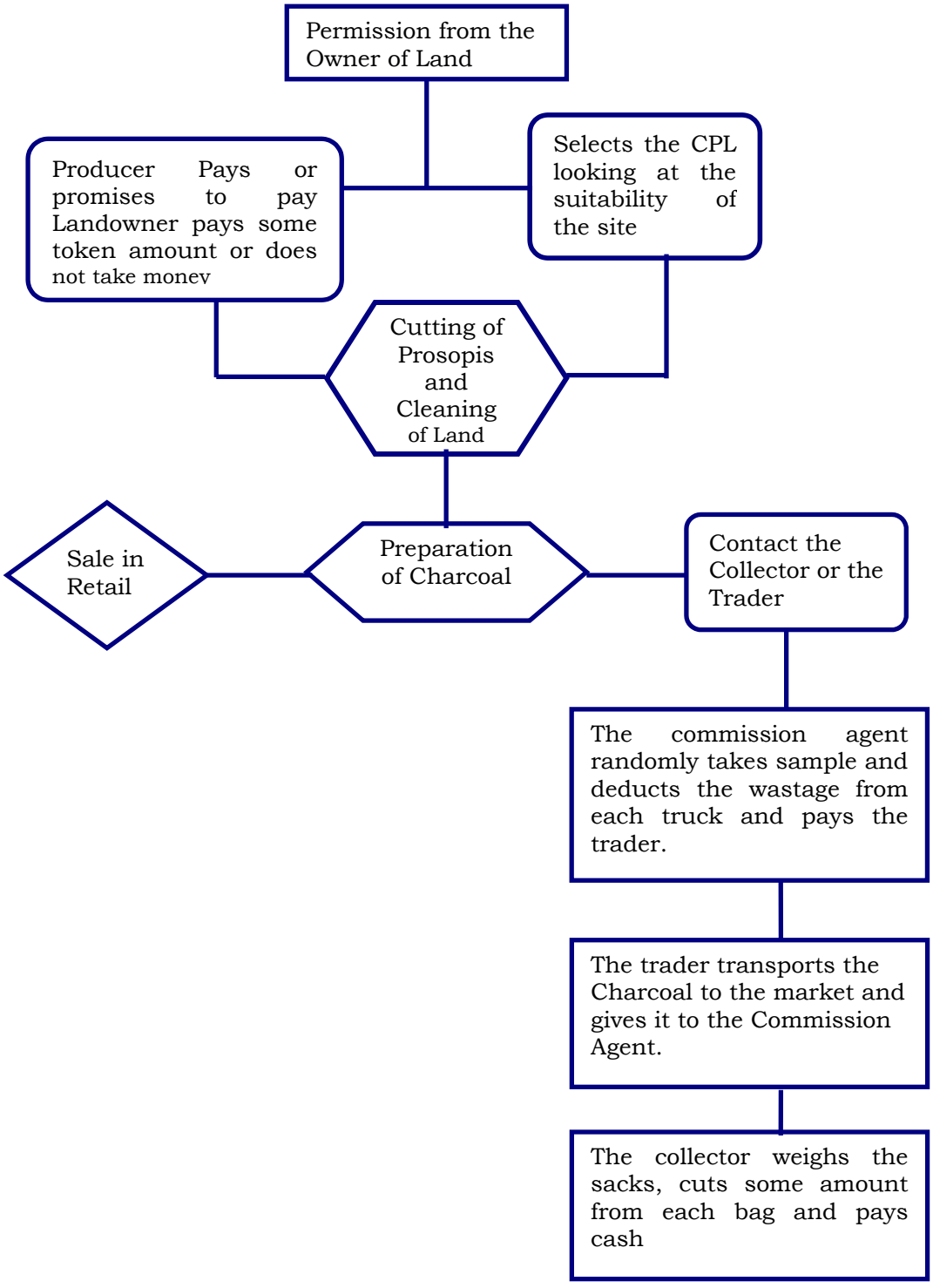


Figure 6: Representation of Scenario 1

3.0 Scenario 2

The Producer works for some trader

Under this arrangement either the producer has taken some credit from the trader or has been working for the trader for a very long time. The trader arranges for the clearances from the Talati (village level revenue department functionary), Forest Department etc. regarding the cutting of Prosopis, transport of the charcoal. The labourers are either from the village or are brought from outside the village. The risk of harassment by the forest officer or other officials is considerably reduced, as now the trader is answerable to the officials.

Case 1
Local Village Workers

In Surendranagar, Rajkot and Patan the workers are mostly from the villages or nearby villages. The traders approach these workers. Though there is no written contract, usually the trader binds the worker exploiting his financial condition by giving him advance (Kharchi) during the cycle of production. Besides the Kharchi other source of binding the worker is the small amounts that these workers borrow as debt for subsistence.

Out of the sample selected for study 61% took credit from the traders. The amount ranges from a meager Rs. 500 to Rs 7,000. Besides getting bound by the credit amount, there are implications of taking credit on the prices paid to the workers. Again this depends on trader to trader and is on the long-term relations between the trader and the worker. 58% of the workers who have taken credit are paid Rs 5 to 7 less than what the worker who has not taken credit.

Case 2: Labourers are taken by the Trader to some other site

The unavailability of Prosopis in some of the areas or their inadequate quantity has led to a semi-organised setup whereby the trader takes labourers from different regions known for its charcoal producing communities to the sites where he has the permission. In the study area 54 % of the sampled workers had migrated within last three years period to some other areas. The areas where the sampled workers had migrated are:

Moti Rav	Kochana
Juna Thanpar	Fatehpur
Kankhoi	Mehsana
Banni	Nirana
Mandavi	Junagadh
Bagasar	

Most of the migrated workers go with their families. In the sample 69 % of the workers went with their whole family. In 8 % of the cases only male workers migrated and in 21% of the cases the husband and wife migrate leaving their children with some relatives in their home. The migration period ranges from 6 to 8 months. Usually the migration starts at Diwali (Hindu new year) time and the families return home before the onset of monsoon.

The families that migrate are most of the time indebted. 70 % of the families who migrated had taken credit from the trader to meet their daily expenses. The credit ranges from a meager Rs 450 to Rs 7,000. Once the credit is taken the family is bound by the trader to go to the sites. Though their was no instance of any interest being charged on this amount, there were instances where the per unit price

paid to the people taking credit was less than the people who had not taken credit. This price differential was from Rs 5 to Rs 7.

In the name of facilities the trader arranges for transportation of the workers to the site, while the return has to be managed by the workers themselves. Other than that everything has to be paid by the worker from his earnings. In the name of shelter some old sacks are given to the families. In some cases the trader arranged drinking water. In case of medical emergencies the trader takes the family to the doctor the costs incurred are deducted from the earnings.

The trader also provides money to meet the expenses during the stay that is deducted from the earnings before the season is completed. Usually the amount is provided weekly and it ranges from Rs 300 to 400 per couple irrespective of the family size.

The lives of the workers are more or less dependant on the benevolence of the trader as there are no written contracts specifying the essentials to be provided. Education and Health are the first casualties in such a case. Children from infants to toddlers could be seen lying naked in the scorching sun playing amongst the thorns of the Prosopis. The situation of these emigrant workers whether, man or woman or child is at its worst and cannot be described in words or covered in a report. Poverty at its extreme can be witnessed at the sites where these workers spend three fourth of a year.

Glimpses in the Lives of the Migrant Charcoal Labourers

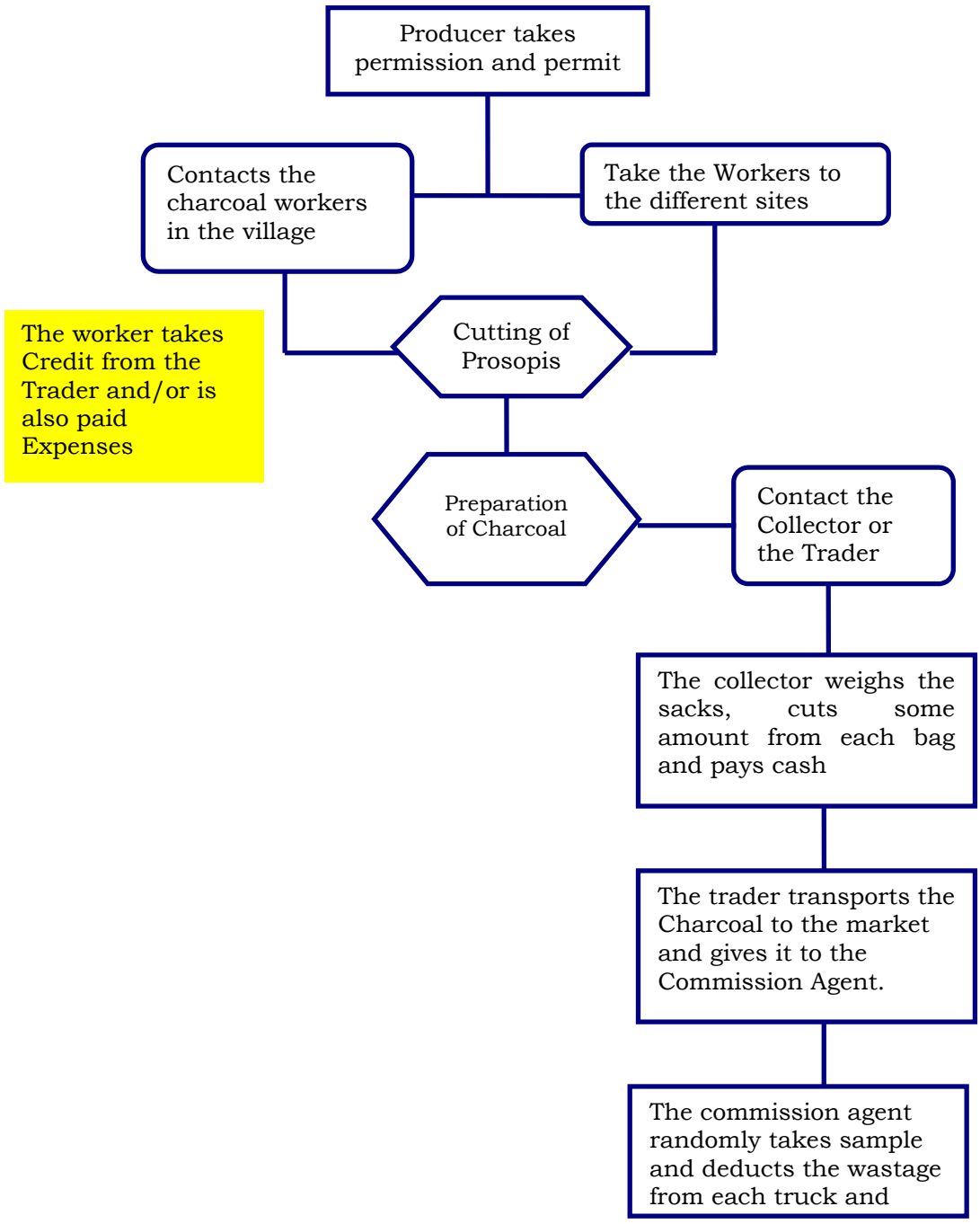


Figure 7: Scenario 2 of the Value Chain

Chapter 3
Pre Production Process

The pre production process refers to the various legalities that have to be adhered to by the Traders and the Workers. The process of submission of the documents[5] related to land and the verification done by the forest officers fall under this step. The various stakeholders identified during this process are:

- Primary Producer
- Trader
- Forest Department
- Revenue Department
- Panchayat.

The involvement of all these players varies according to the type of land from where the raw material is accessed. In case of individuals undertaking the trade at a small scale without any support from the trader in the village, no formalities are followed. The worker only takes permission from the private land owners and do not apply to the village panchayat or the talati for any permission as they do not themselves go for selling of the charcoal. In case of a semi-organised set up where the trader is involved, he applies for permit from the revenue and forest departments prior to the production by the workers. The trader then hires labour to make charcoal from the Prosopis for which he has sought permission.

In the study, 69% workers were identified who undertook production in the village itself during this season. Out of this, 29% had their own plots of land that had Prosopis while the remaining 40% used the village wasteland, pasture and others land for sourcing raw materials.

1.0 Findings of the Study

The involvement of the primary workers has been minimal during the pre-production process. It is usually the prerogative of the charcoal trader to take permits and clearances from the forest and revenue departments. This process has various loopholes that have led to a high amount of leakages in the system that are referred to as incidental costs (read as greasing the hands of officials). Out of the sample only 12 workers (15%) had some information regarding the whole process of taking clearances. 8 out of them cited economic reasons (– investment requirements and the initial costs involved in selling the produce) for not applying for permit themselves. Only 3 out of the sample of 84 had tried for permit on their own and that too due to support from NGOs. However they too have not been able to reap the benefits due to corrupt practices. Only 1 person out of the 84 workers could get a permit a few times but had to discontinue due to lack of financial muscles in front of the strong lobby of traders and commission agents as well as the problems involved in transporting the produce.

The team came across two villages where Women groups were involved in the trade. One was supported by SEWA in Agichana village of Radhanpur Taluka; Patan district and Deepak Charitable Trust in Tikar Village of Halvad taluka in Surendranagar district supported the other. These groups had been able to mobilize their savings to withstand the strong lobby and were able to sell their produce on their own but were able to eliminate only the collector and not the trader. As such the prices realized were not as lucrative especially for a group activity. The situation of these groups can at best be described as case studies

[5] *The relevance of these players has reduced significantly now. The new resolution can be termed as a liberalization of the charcoal industry and it needs to be seen whether it suffers from the same problems of inequity or is utilized productively for a win- win situation for the primary stakeholders..*

which can be strengthened further to make it a replicable model not only for women's group but also any group initiative for charcoal workers.

Permit system and the subsequent systems could be described as one process, which stymied the entrepreneurial zeal of some of the charcoal producers. This has further implications in the formation of a strong lobby of charcoal traders who rule the whole value chain taking the lion's share. The systemic exploitation starts from the pre-production stage itself.

Recently some changes in the legislation have been introduced whereby the permit requirements have been scrapped from the non-forest areas. The implications of these changes on the workers will however be very gradual as there is already a strong lobby that will be able to reap the benefits of the trade.

The new resolution was passed on the 13th of December 2004 and has been circulated to all the Assistant Conservators of Forest (ACFs) of Government of Gujarat to be implemented with immediate effect.

Ministry of environment and Forest
Resolution S. No. : 102004-2033-6

The resolution allows for the cutting of the Prosopis from any land without taking any ones permission except from the protected and reserved forest area. The second clause gives the Forest department the responsibility of reducing the growth of the Prosopis according to the rules.

The resolution also makes use of the powers as specified under the Indian Forest Act 1927 Clause 41 (3) regarding the authority of the government to exempt any timber or forest produce from the purview of the act. It has allowed for the production of Charcoal from Prosopis **without the need for taking any permission including transport pass except in case the area falls within 2 Km of the coastal areas and 1.6 Km from the reserved forest areas.** In the above two exceptions permission will have to be taken from the concerned forest official.

The next clause removes the authority of the Forest department from any private land or land belonging to Panchayats even IF it falls within 1.6 km of the protected or reserved forest area. The resolution also allows removal of Prosopis and any other harmful vegetation, by NGOs, Panchayats or any other agency and permits the use of the district planning fund or the MLA fund or any other fund by NGOs. The authority of such an activity will reside with the collector. The forest department will have no jurisdiction over the same.

The above-mentioned resolution has reduced the stakes of the forest department as well as other government officials allowing the activity to become more market oriented. The impact is yet to be seen and the development agencies taking up the charcoal trade for the primary producers will have to facilitate the use of such policies among the producers and also stand against the strong lobby of the existing traders who have the first mover advantage, the advantages of economies of scale and also the advantage of existing relations with the end consumers.

Under the previous policy the trader had to take permission from the revenue after showing the 7x12 land map and the clearance from the panchayat in case the land belonged to the panchayat. The revenue department sent it for verification to the range forest office in case there was a forest area. The forester estimated the total production possible from the land for which the permission was requested. Based on the estimates of the forester the transport pass was issued by the forest department or the revenue department. The pass had the truck number, the number of sacks of charcoal, the date, time and place where the truck was to go along with the name of the trader.

The power struggle between the revenue and forest department has seen many turns especially in case of authority related to charcoal permits. Initially as charcoal came under the NTFP under the Forest act 1927 the forest department had the jurisdiction over any production or movement of charcoal. In 1998, after a lot of struggle and political pressure, a GR was passed, reducing the control of the forest department.

However gradually the cases of corruption and lack of expertise of the revenue department in dealing with a forest produce led to more interference from the forest department. The authority given to the village functionaries were many a times taken back by the forest department.

Given the past experiences regarding the transit pass and other permissions regarding the charcoal, the new resolution that seems to be more concerned with removal of Prosopis may not be the final word on the issue of Charcoal.

Subject : Transit of Charcoal Obtained From "Gando Baval."
Standing Order No. 1 of 1998
Chapter No. VI
Gandhinagar Dated. 10/9/1998

Constant complaints are being received from the public that there is much delay in the disposal of request for Transit Passes for the movement of Charcoal manufactured from "Gando Baval" (Prosopis Juliflora) obtained from Maliki lands. There have also been suggestions on the issue in the past, to exempt such Charcoal from the purview of the Transit Pass.

2. With a view to mitigate public grievances and to make the department more responsive to the public, suggestions were invited from the Chief Conservators and the Conservators of Forests in respect of relevant rules in so far as they apply to the manufacture and transit of Charcoal obtained from "Gando Baval".

3. After careful consideration of suggestions received in the light of existing statutory and administrative provisions in this regard, following points are reiterated for careful consideration and immediate implementation by all concerned so that there is no scope of complaints from the public on this account.

A. "**Gando Baval" (Prosopis Juliflora) standing on Maliki lands, being not a "tree" in accordance with Official Gazette Notification issued under Section 2 (c) of the Saurashtra Felling of Trees** (Infliction of Punishment) Act, 1951 ; felling it by the owners does not necessitate official permission.

B. **As per Rule 88 of the Bombay Forest Rules, 1942; manufacture of Charcoal requires official permission by a Range Forest Officer (Territorial), only if the Charcoal Kiln is to be established within 1 Mile (1.6 KMS.) of any Protected, Reserved or Section 4 forest area in his charge. Beyond such distance, no permission from the Forest Department is necessary.**

C. Charcoal being a "Forest Produce" (as per Section 2, interpretation clause (4) (a) of the Indian Forest Act, 1927) **whether found in, or brought from, a forest or not, requires to be transported only under a transit pass as per Rule 66 of B.F.R., 1942. Such Transit Pass can only be issued by an officer or person duly authorized in this regard under Rule 67 of B.F.R., 1942.**

D. The Rule 67 (1) (a), and the Government Resolutions of Agriculture and Co-operation Department No. IFS. 1266 / U.O. 495-P, Dated 1 May 1968 and, Forest and environment Department No. SFT/1292/M-96/V-2, **Dated 30-7-93 issued there under have, subject to the provisions in this rule, authorized Talati-cum-Secretaries or Village Secretaries and the Sarpanchs of the villages to issue Forest Passes as prescribed under Rule 68 of B.F.R., 1942.**

E. T**he clause (b) of Sub-rule (1) of Rule 67, authorizes the Conservators of Forests, the Dy. Conservators of Forests and the Sub-Divisional Forest Officers to authorize in this behalf in writing, the village functionaries as mentioned in (D) above, for the purpose of issuing Transit Passes for Forest produce** from areas other than those that are described in clause 1(a) of Rule 67.

4. The existing statutory and administrative provisions, as described in forgoing paras, being quite liberal and adequate to address to the requirements of the public, the delay in issuance of Transit Passes or any cause of complaint on that account, can only be attributed to the administrative default and the wrong impression that only forest officers are authorized to issue Transit Passes, than to anything else. Having thus brought these provisions to the notice of all the Conservators of Forests, it is reiterated that the issue be suitably clarified and brought to the notice of all concerned so that there are no more complaints on this account.

Discounting the various legal aspects involved, the fact of the matter remains that despite such regulations, the producers who are the focus of our study may still not benefit from any such policy level changes. The information asymmetry, which everyone talks of, has been very acute and barring a few examples, there was no initiative from any agency to remove this asymmetry as far as the charcoal workers are concerned. 85 % of the sample had no information regarding the legal process, nor were they aware of what was allowed and what was not, except that forest officers can take them to task if they cut trees from the forest. The ignorance of the workers could be best seen by the fact that as soon as the study team reached any village there was a lot of apprehension and fear. At many places the study team could see people fleeing from the sites. The fear of harassment was more acute for workers who did not work for a trader.

This fear due to ignorance has been very "creatively" used for suppressing any possibilities of entrepreneurship among the working class. The officials use it for harassing the workers for some gains while the traders use it for suppressing any possible negotiations for rise in price. Though there were only a few examples of punishment given to the workers (only 8 respondents out of 84 accepted being punished by either the forest or the police.) However the fear has been so deep rooted that it raises questions regarding the role of agencies including NGOs in spreading awareness.

Chapter 4
Production Process

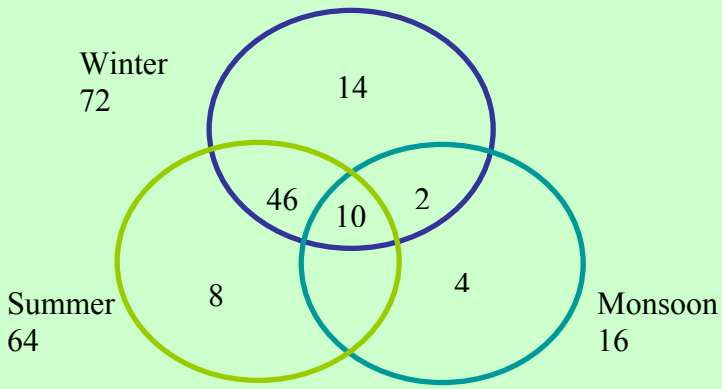
1.0 Introduction

The production of Charcoal involves the carbonization of wood at a very high temperature (Pyrolysis). The process of production generally involves ten steps, each step having its unique difficulties and impact on the quality of charcoal as well as its impact on the lives of the charcoal workers.

The activity is largely done during the months of winter and summer. In Monsoon the activity is confined to regions where the rainfall is either very low or is confined to a few days. In such areas monsoon helps to loosen the soil reducing the drudgery in removal of roots. However this was not a common practice and only 16 respondents (19%) carried out the work during the monsoons. In areas where agriculture labour was available, the charcoal workers undertook labour on farms rather than making charcoal in monsoon. Some of the sample (Income from charcoal as a supplementary source usually with lower dependence on charcoal) did not undertake the charcoal trade during winters because they could get some work in the cultivation of cumin in Saurashtra region.

As the Venn diagram explains, 10 out of the total sample size of 84 undertook the activity throughout the year. Only in 16 cases charcoal production was carried out in monsoons, in 72 cases winter was the season that saw the largest production, though a very significant number 64 out of 84, especially those who migrated also undertook work during the summer seasons.

Seasonality Of the Trade



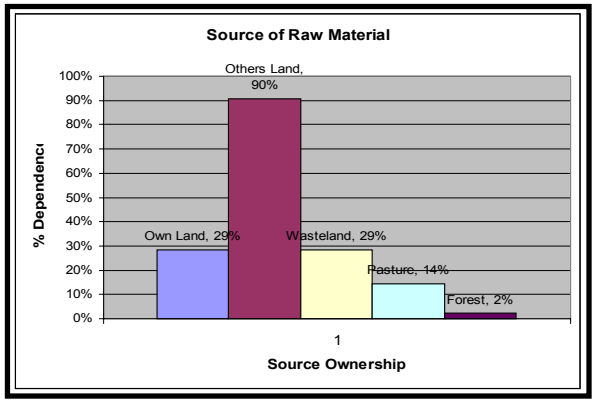
2.0 Stage 1
Arranging for the Raw Material

2.1 Step 1
Selection and Cutting of Prosopis

The cutting of Prosopis is a tiring job that involves not only the physical work in cutting the tree but also taking care of the thorns. In some cases the workers used fire to burn the small branches and thorns to reduce the drudgery of cutting the larger branches.

The thicker the wood the better the quality of charcoal. On discussions with the workers it came out that wood with a diameter of 3 inches is considered good for Charcoal. However availability is a problem and the workers have to compromise on the wood quality. It takes three to four years of growth of Prosopis to become useful for the purpose of making charcoal.

Uprooting of Prosopis is another Herculean task, which takes a lot of time and energy, but the quality of charcoal as well as the transformation efficiency is much better when roots are used. In case of private plots of land the uprooting of Prosopis is a compulsion, as unless and until the roots are removed the Prosopis would go on propagating itself and at a much faster rate.



In the sample a large portion of the sourcing of the raw material was done from private plots of other farmers. The distribution is represented in the figure below. More than one source has to be depended upon. The variation is largely because of availability in right quantity and quality.

Gender Issues

The cutting of Prosopis for Charcoal purpose is most of the time done by the men while women help in removing the thorns. Uprooting of roots again involves a lot of physical strength and is mostly done by the men. This is not to say that women are not involved in this step however their role is less in the cutting of the tree. The women fulfill their share of responsibilities as well as some of the responsibilities of their husbands during this time.

Health Issues

The occupational hazard, which is inherent in the whole process of production starts from this stage. Cuts, bruises, thorns etc. are the common injuries, which the workers have to suffer at this stage. The unavailability of first aid facilities further aggravates the problem.

Legal Issues

With the new resolution of the government there would be no restrictions on cutting of Prosopis from any land except for the protected and reserved forest area.

Labour days Required

The number of days required for cutting enough wood for 15-20 sacks of Charcoal (approximately 600 – 800 Kg of charcoal) ranges from 6 to 15 days depending upon the availability of the wood and whether the roots are uprooted or not. Rough calculations suggest that 2000 kg of wood would be required to produce so much charcoal. The variance is therefore also a factor of the capacity of the labour.

2.2 Step 2
Transporting/Carting it to the place of Production

In majority of cases, the cutting of Prosopis and the place of production were in the nearby vicinity, however in some cases the workers transported the wood to a place, either near their house or a place, which was safer. Transportation is done only after the wood is cut and thorns removed.

Gender Issues

The women play a very major role in the transportation of the wood to the site of production.

Health issues

The Prosopis is usually cut from remote sites; the wood is therefore carried on the head. The bad roads, thorns on the route causing injuries, compound the physical task. Again lack of first aid facility further aggravates the problem.

Legal Issues

In many cases, this step was resorted to only because of the remoteness of the place in which the Prosopis had to be cut. In some cases however this was resorted to avoid harassment by officials.

Labour Days required

This is undertaken simultaneously while cutting of trees.

2.3 Step 3
Chopping the wood and removing of thorns

The Prosopis is cut in regular sizes and the thorns removed before the preparation of the Kiln. The size and cutting of wood and roots determine the quality of the charcoal.

Gender Issues
The Women are largely involved in this step. After fulfilling her various chores the woman helps her man in chopping and removing the thorns.

Health issue
The issue here again is related to injuries and is similar to those as mentioned in the previous steps.

Labour Days Involved
This activity is more or less done simultaneously while cutting the tree if there are more than one persons involved.

2.4 Step 4
Drying of wood

This step according to various studies determines the transformational efficiencies. Ironically it is many a time not taken as an important step as was clear from the discussions with the workers. The reason for this is that moist wood produces only half as much heat as dried wood, reducing the transformation efficiency.

The chopped wood, root etc are spread on the ground and allowed to dry for a few days before the kiln is prepared. This is the final step of stage 1. The total labour days ranges from 6 to 15 days, depending on the efficiency of the labour, availability of raw materials etc.

3.0 Stage 2
Preparation of Kiln

The kiln used by the workers in the study area is a largely earth mound kiln which are criticized for being less efficient. However the reason for the popularity has to do with the financial aspects related to the preparation of an Earth mound kiln as compared to other improved designs, including kilns built of brick, concrete, or metal. The making of the earth mound kiln requires nothing except for the labour, which is anyway not accounted for. As such there are no investment requirements except for the opportunity costs of undertaking charcoal making. However, as the opportunity cost is more or less nothing, charcoal production in earth mound kiln makes more economic sense than investing money borrowed at high rates of interests to have an improved kiln.

3.1 Step 1

The stacking of wood and preparation of kiln takes 2 to 4 days depending upon the size of the kiln. Though it is possible to make very large kilns, the risks associated with larger kilns both in terms of wastage due to incomplete combustion are very high. Besides during the process of Pyrolysis the kiln has to be constantly supervised and the vents have to be covered, in case of large kiln the worker has to use a ladder like structure to get to the top of the kiln, which is very dangerous.

Gender Issues

The preparation of kiln involves both women and men. Proper stacking of wood is very important task and has to be looked into during the whole process.

Labour days required

After the wood is dried, it is covered with the sand and leaves. The stacking takes 2 to 4 days.

3.2 Step 2
Pyrolysis

The process of Pyrolysis requires constant supervision till the time the combustion is complete. The worker cannot afford to sleep during the whole process as a sudden breeze and a small vent can cause complete combustion, completely wiping out the hard work carried out by the workers.

Gender Issues

The role of woman as a provider for the family and also a worker creates a situation where the woman has to suffer from enormous physical and mental strain. The normal timeline is not applicable during the process of Pyrolysis, as the earth mound has to be constantly covered and supervised to avoid excess oxygen supply.

Health issues

Insufficient sleep, exposure to smoke, unavailability of timely food or water aggravates the issue. Along with the grown ups who are indulged in the process the children especially infants suffer the most.

Labour days

The quality of charcoal is determined by the extent of carbonization, which has been undertaken. A good Pyrolysis is what ultimately determines the quality. However as mentioned previously the time quality trade off sees time as a major factor for the workers as the quality of the produce is not linked to the prices paid and only the quantum is important for the workers. The labour days ranges from 1.5 days to 4 days.

3.3 Step 3
Breaking of the Kiln

After Pyrolysis is over, the kiln is broken/opened. The kiln has to be opened safely as most of the injuries caused due to burns happen during this stage.

The process of production is over with the opening of the kiln. This is followed by the third stage of packing the charcoal.

4.0 Stage 3
Packing

4.1 Step 1
Cooling the Charcoal

The kiln after being broken has to be cooled before packing. This can be done either by sprinkling water, which is a much faster way of cooling and the other is by using sand and spreading the charcoal with a shovel.

The first process is faster and there is a perception among the workers that it also increases the weight of Charcoal. This is a questionable perception, as the water would anyway get evaporated. This has a negative impact on the quality of charcoal as the charcoal breaks when water is used to cool it.

Health Issues

The process of cooling requires handling of extremely hot material and also the charcoal dust. Both are health hazards that can have possible implications on the long-term health of the workers.

Gender Issues

Initially the men undertake this activity. After the material is spread, the women also get involved in spreading the charcoal.

4.2 Step 2
Packing in Sacks

In all the cases where charcoal was sold to a trader the trader gave the sacks. The responsibility of packing lies with the worker. Each sack weighs around 37 to 40 Kg. The unit of measurement used is *`Mann'* in both Kutch and Saurashtra. However, we use Kilogram as the standard term as there is variation in the unit as used in Saurashtra and Kutch. (1 Mann=20 Kg in Saurashtra and 40 Kg in Kutch).

During the packing process there is large-scale use of small chips, dust to increase the weight of the sack. In some cases the trader brought the sacks after measuring the weight irrespective of the quality. In some cases (depends on the trader) the trader used to sample a few sacks randomly and deducted the weight of the waste material across the total sacks. In few cases there was straight deduction of 2 Kg from each bag as a discount for the waste material.

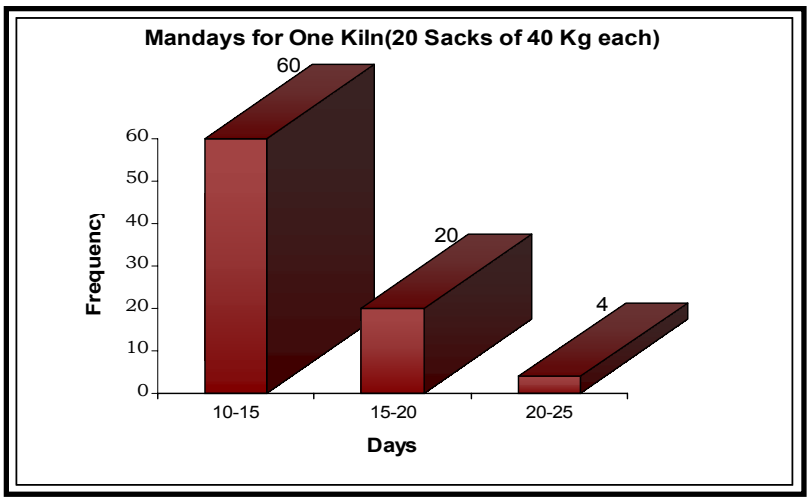
Gender Issues

The bag filling and packing work also involves women.

Health issues

Issues of charcoal dust inhaled while undertaking the packing are a hazard even during this process.

This completes the whole production cycle. The number of days taken for the preparation of a kiln as mentioned in each step is a variable of various factors. In the study the figure represents the total labour days required at various sites visited during the study.



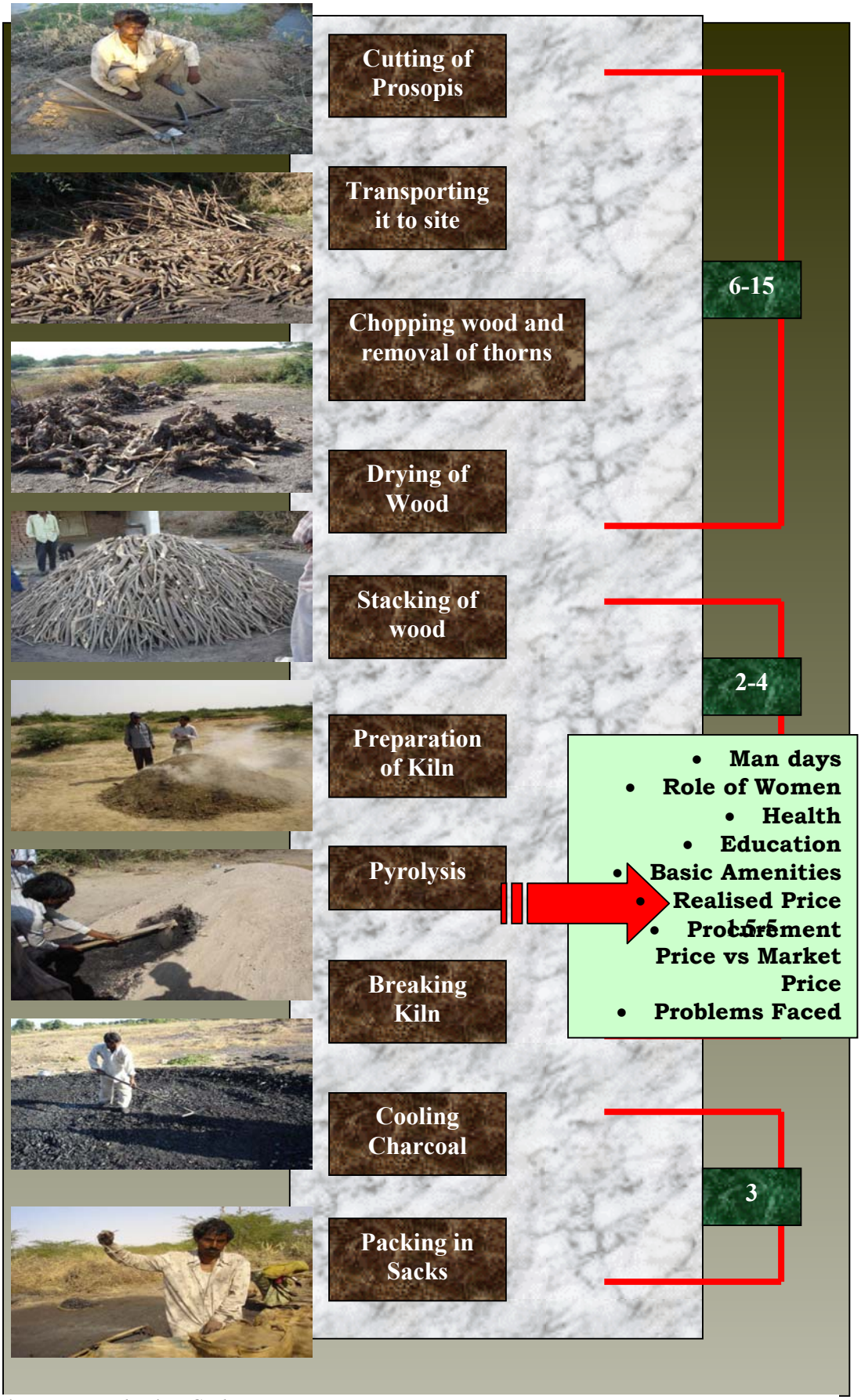


Figure 5 : Production Cycle

5.0 Basic Amenities

As previously explained, the workers belong to socially and economically marginalized communities of the society. The caste dynamics and the consequent exploitation in terms of access to electricity, water, schools, primary health centers (PHCs) have been present and unfortunately have not been able to be addressed by the agencies working in the area. The hamlets of the Koli Patels are still deprived of the amenities, which is as rightfully theirs as anyone else in the village.

The reason for this exploitation is two fold, one is of course the poverty stricken condition which restricts the use of many basic amenities which come at a cost, the second is the fact that most of the charcoal workers are also migrant laborers who spend a major part of their year outside their own homes.

The migrant population and their plight have been addressed in the Chapter 2 of Section 1. Out of the total sample surveyed, 54% have either migrated this year or have migrated within the last three years.

5.2 Basic Amenities for Migrant Population

5.2.1 Shelter

28% were provided some assistance in arranging for shelter. On further probing it came out that the arrangements were confined to giving old sacks and some tarpaulin to cover their heads. Most of the time the workers searched for a tree shed where they could tie these sacks and make a temporary shelter. Ironically this temporary shelter is a house for them for a larger number of days as compared to their permanent houses.

5.2.2 Medical Services

21% of the migrant populations were provided assistance in the form of arranging the patient to be taken to the doctor. The expenses of all these arrangements are deducted from the earnings of the worker. In case of some minor ailments the trader provides the medicine.

5.2.3 Drinking Water

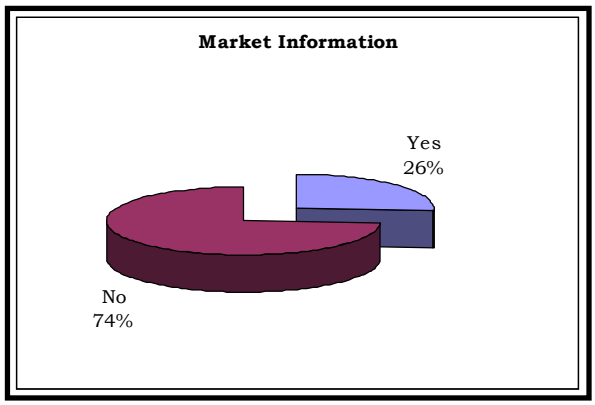
26 % of the migrant population was provided a source of drinking water at their sites. In all the other cases the women had to arrange for the drinking water either from the nearby tank or from the village. In the areas where the trader had arranged for the water it was not charged from the workers.

5.2.4 Transport Arrangements

The transport of the workers from their respective villages to the site is the responsibility of the trader, at the site ration was brought at periodic intervals. While returning back the workers had to arrange for their own transportation.

Chapter 5
Markets

Markets form the determinants for the prosperity or the deprivation of any producer. In the unorganized sector unfortunately the distance between the Producer and the Market does not allow the proper remuneration to reach the producer. The large and highly dispersed production also means information asymmetry reducing the producers to mere price takers.



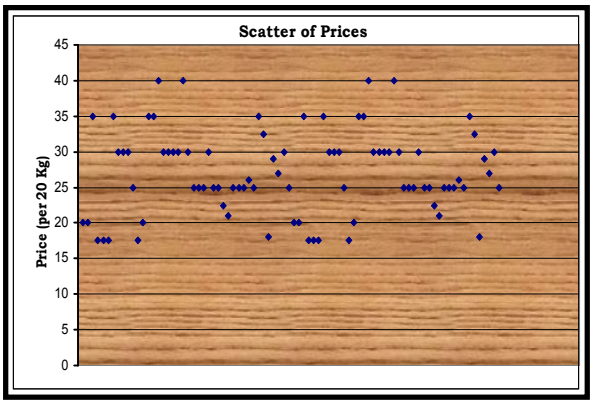
1.0 Product Attribute

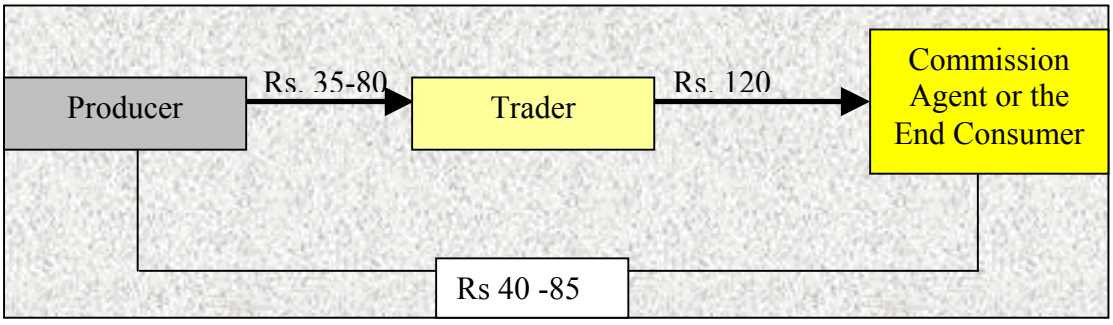
Charcoal is good for slow and constant burning. This attribute makes it a favorite over coal in many industries. As compared to other fuels it is cheaper and is also a renewable energy source. The production process is largely decentralized with very low quality control and consistency with regards to carbonization. In the study area the team could not come across any new technical innovations over the traditional earth mound kiln that is used by the workers. At the procurement stage the quality of the product is determined by the wastage in randomly selected sacks of charcoal, in many cases even this is not resorted to. But when the trader sells the product to the end consumers or the agent or consumer stringently checks the commission agent the quality via means of random sampling. The prices are accordingly determined.

2.0 Prices -Procurement vs End Price

The procurement price of one sack of charcoal that is roughly 40 Kg in weight ranges from Rs 35 to Rs 85. This huge price differential is largely owing to the **strong hold of the traders, the weak bargaining power of the worker and ignorance of the actual price**s in the market.

The selling price to the commission agent for the same sack is more standardized and at present is around Rs 120 per 20 kg and is largely determined by the market demand.





After the production process is over either the trader or his collection agent purchases the produce by giving cash. The produce is kept in a safe place until there are enough sacks to

load a truck. The forest department allows 240 -250 sacks in a truck but here too there are loopholes and the trader usually tries to pack as many sacks as possible to reduce the transport cost per bag. Previously the travel pass included the date, time drivers name, the traders name etc, but after the resolution of 13th December 2004 the requirement for the travel pass has been removed. The implications of this new resolution on the procurement prices are yet to be seen.

2.1 Traders Share in the trade (per truck)

Particulars	Per Mann (in Rs)	Load in a truck (Mann)	Amount (in Rs)
Traders Cost			
Procurement Price	60	480	28,800
Transport Cost			4,000
Incidental Expenses *			4,000
Wastage	2kg	24 kg	
Effective Sales Quantity		456	
Commission to agent		1,200	1,200
Traders Revenue			
Selling Price	120	456	54,720
Net Profit			**16,720**

***They include largely the amount to be paid as bribe to the various officials who are able to make use of the loopholes in the system and are able to misuse their authorities.

At a conservative estimate one trader can make Rs 16,000 from one truckload of charcoal. His risks involve getting caught due to some irregularities, quality check by the end consumers or sudden flush in the market reducing the sale prices. The brunt of all these risks is passed on to the producers in the name of bad business. The producers even if they are independent are always short of cash and holding on the charcoal is not feasible for them. Besides each area has a strong hold of a few traders who do not allow the producers to search for new buyers. The result is the trader reaps the benefits of the trade. This phenomenon is not new in the rural areas and has been accepted as a fact of life by the producers be it agricultural producers or any other primary sector producer, who are not provided any alternative mechanism.

The difference in the procurement and the selling price is almost 100%! The need for intermediaries in the trade can not be ruled out as producers can not always done the role of traders, but there needs to be some creative ways of reducing the difference so that the producers can gain much more from their hard work.

Section 3
Recommendation

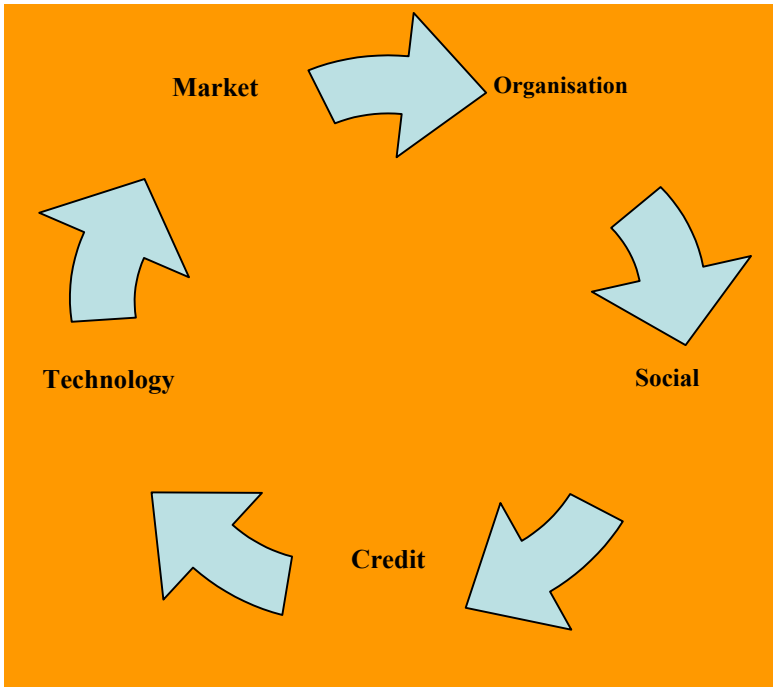
Chapter 1
Conclusion & Suggestions

The previous sections have tried to give an over view of the charcoal trade as is practiced in the areas of the study. The purpose has been to bring to notice certain critical points, which can be sealed to make it a more attractive proposition for the charcoal workers. Before recommendations the various constraints faced by the workers, their capacity, willingness and ability, the environmental considerations including the ecological aspects have been kept in mind.

The recommendations are also based on practical knowledge of rural conditions, the problems faced due to information asymmetry, the high transaction costs involved due to highly dispersed production facilities and the limitations of the rural producers in general.

The recommendations are therefore based to cover aspects not in compartments but in an as poverty cannot be compartmentalized as it comes in an integrated way. Economic deprivation, social deprivation, physical vulnerability are not various compartments but are the outcome of the same evil.

As mentioned previously the purpose of the study was to identify areas as points of intervention. The recommendations therefore cover the following areas of intervention –



Given the constraints of the development agencies it is a difficult task to target all the aspects as shown in the figure and may require prioritizing the areas. However one thing that is clear is the need for intervening in all the above aspects to improve the living standards of the charcoal workers.

1.0 Organizational Interventions

There have been cases of some NGOs trying to organize the charcoal workers. During the course of the study one of the organisations of the charcoal workers in Tikar village was visited. The charcoal workers in the village also have other occupational sources and the

dependence on charcoal is not very high as compared to the other families studied. Another widely quoted organised set up is the **Vadgam Cooperative in Daheda** supported by Behavioral Science Centre. These are however not traditional charcoal workers and the cooperative members belong to the Vankar Community. **The Asanvad Sanyukta Kheti Sahkari Mandali**, a cooperative of agricultural laborers had been systematically using the wastelands for cultivation of Prosopis, its cutting and production of charcoal. The purpose of quoting these examples is to establish the possibilities of such an organised setup for the charcoal workers in the study area.

The homogeneity both in terms of the social and economic status of the charcoal workers along with the removal of restrictions on the cutting of charcoal provides an opportunity to organize this occupational class that was earlier not possible due to the legal problems associated with the trade.

The communities involved in the trade can be organised into groups, but this should not be the final outcome. The various producer groups would need to be linked to gain a competitive advantage over the market forces. Individual group of producers can gain some advantage but these advantages would not be long lived.

The need for groups would also be required to avoid the high transaction costs involved in other interventions.

2.0 Technical Interventions

Charcoal production can be improved on a large or small scale. There are immense possibilities in increasing the transformational efficiencies of production which would not only be ecologically sustainable but will also help increase the productivity of charcoal from the same quantity of wood. The need is to develop safe and clean technology for the charcoal workers.

2.1 Option 1

There are two possibilities of improving the transformational efficiency one is slightly cost intensive whereby improved designs of kilns can be introduced. Kilns built of brick, concrete, or metal, have better carbonization control, higher conversion efficiencies, and production of a cleaner end product.

More sophisticated designs and building materials (brick, concrete, or metal) can be even more efficient but may require substantially higher capital investment. A relatively expensive alternative is the portable steel charcoal kiln, which consists of two cylindrical steel shells, a conical lid, and four chimneys. It has been used throughout the world for many years. The chief advantages of such kilns are ease of operation, increased rates of recovery (15 to 20 percent), relatively short production cycle (72 hours), and relative portability (by truck or animal-drawn cart). **The high capital cost makes it prohibitively expensive for traditional producers who do not reap much economic benefit from improved conversion.**

The Char Lanka Project

These kilns have been used successfully in conjunction with large-scale agricultural land clearing and on large plantations where periodic portability is desired. For example, the "Char-Lanka" project in Sri ***Lanka*** takes advantage of an expanding market for charcoal to make beneficial use of the timber cleared from a large agricultural development project area. A major U.S. bank helped finance both small-scale artisans to fabricate portable metal kilns and small-scale charcoal producers to lease such kilns. Eventually over 200 kilns will be built locally (27). In some tropical countries, charcoal already accounts for a significant fraction of total wood fuel use and it is increasing its market share, particularly in urban centers. Given the low conversion efficiency of most charcoal production, the increasing substitution of charcoal for wood with its attendant energy losses will exacerbate problems of wood supply/demand imbalance. Because small cottage industry labourers produce most charcoal part-time, many or most of whom operate illegally or extra legally, it is particularly difficult to launch national or regional campaigns to improve charcoal production efficiency. Char-Lanka is one potentially promising model that could help small-scale kiln producers function more effectively. The peace Corps and others sponsor many local efforts to improve traditional charcoal producers' operating efficiencies, but so far substantial improvements in forest resource depletion rates have not been demonstrated.

There is a need for designing appropriate kilns suiting the conditions of the charcoal workers. As in a majority of he cases the labourers migrate from one place to another taking these kilns to another location may be problematic. Costs involved is another constrain, today these workers do not need to invest any money in the production process, therefore selling the idea of improved kilns on the basis of conversion efficiency and health as well as the advantages in monetary terms will have o be proved and demonstrated.

2.2 Option 2

Another cost effective way of technical intervention is to improve the conversion efficiency of the traditional earth kiln. The conversion efficiency of a traditional earth kiln can be improved 50 percent at low cost simply through improved kiln operation, which can be done by:

- Use of only dense, dry wood chopped into relatively uniform pieces;
- Assuring that the wood is packed as tightly as possible;
- Assuring the earth covering the kiln is sufficiently thick to prevent complete combustion;
- Proper spacing of initial air vents;
- Careful monitoring of combustion and later carbonization conditions

In addition, at minimal cost, flattened metal cans or other scrap sheet metal can be inserted between the stacked wood and the insulating earth layer, reducing dirt contamination. This is more or less dissemination of information and would require skill development through mutual learning.

2.3 Option 3

The cutting of Prosopis is perhaps the most difficult task in the whole production cycle demanding immense physical labour. Improvements in the cutting technology may be another area of technical intervention. Introduction of better tools and implements is a possibility, which cannot be overlooked. There was some intervention, which had been planned as a part of the ADB-JFPR project (see box).

Initiatives Planned for the Charcoal Workers

An experiment in ecology promoted by the Society for Promotion of Action on Clean Environment (SPACE), an organization that advocates use of cleaner technologies, is helping curb the spread of the "Gando Baval," a local thorny tree that is rapidly exhausting underwater resources and causing severe environmental damage by spoiling the soil for cultivation of crops. GOG has permitted the poor to cut these trees to facilitate agriculture activities and save the groundwater resources from drying up. The wood from these trees can be used for producing charcoal, which is widely used in Gujarat both for domestic purposes and industrial uses. Under component (ii) of the JFPR project, SPACE proposes to introduce battery-operated handheld sawing machines, and some process equipment, such as crusher units, burning units, and charcoal tubing machines to help the poor increase charcoal production. As a pilot project, one cutting and processing unit will be given to a poor family from a tribal community known as Padar Kohlis in Kochadia village. It is proposed that the village administration will offer the family members an area of 3,000 square feet on a nominal rent, and train family members in product processing and marketing. This will become a demonstration unit for other families in the profession, providing training and capacity building, which can be replicated among another 20–25 families, benefiting about 150–200 women. Further, the beneficiaries will be linked to local banks for savings schemes. With the introduction of these machines, the production cycle of charcoal will be reduced, the ratio of raw material required per kilogram will be reduced

Point of caution: The present system does not promote quality consciousness among the producers and therefore sustainability of introducing new ideas to increase the conversion efficiency would be possible only when the technical interventions are able to either reduce the cost which in the present case is time or increase the realized price of the produce.

3.0 Credit Intervention

One of the areas of exploitation has been the need for money at a time when there is no labour work available. This results in the worker getting indebted to the charcoal trader who uses this vulnerability not only to pay low prices but also his independence in pursuing his occupation in the way he wants to. With the assumption that there would be market intervention this may lead to problems for the marketing agency. Group formation and linking it with credit facilities can be a major intervention to break this cycle of indebtedness and vulnerability. The repayment schedule can be worked out coinciding with the production cycle of charcoal. Saving activities can accordingly be promoted once such an organised set up is formed. Such a group intervention is possible also in case of migrant populations as the migrating population usually goes in groups belonging to same village.

4.0 Market Intervention

There is an existing market that is presently in the control of traders and Commission agents. These players in nexus with people in authority have been able to gain a first movers advantage during the "permit raj." It is difficult to break this nexus and would require considerable resources as well as energy from external development agencies to prevent harassment of the producers. The markets look a very lucrative area of intervention but there are possibilities of conflict that may jeopardize the situation of the already vulnerable communities. At present the nexus is so strong that even the traders are unable to sell their products directly to the industries. This is true not only in the case of market at Morbi but also in market at Asarva of Ahmedabad. It would therefore be a good idea to intervene only when the other interventions that are not directly conflicting with the interest of the strong nexus are sufficiently strong. Unless and until the economies are reached small interventions in the market will not be sustainable as has been clearly pointed out by AMUL in case of milk. Evolution from a price taker to a price maker would require expertise in the field of procurement and marketing which unfortunately is not the expertise available to the charcoal producers.

In the mean time the interventions along with reduction in the information asymmetry would have a systemic though gradual change in the prices realized by the producers. The present changes in the regulations should be converted into a win situation for both the producers and the traders. This would require working with the market forces instead of fighting or resisting it.

5.0 Social Interventions

Along with the interventions in the production and marketing of Charcoal other aspects of health and education for the targeted communities is equally important. The unavailability of such facilities have made these workers indifferent and apathetic to the issue of health and education.

Despite recognizing the need for education for their children the need for physical labour and unavailability of any means to educate their children has led to suppression of such a need.

In the case of medical facilities as mentioned previously preventive health care is seldom a practice due to financial constraints, medical facilities are only utilized when the situation is extreme.

Mobile Health and Education facilities can be a possible intervention in this regard. The utility of such a mobile facility is more relevant for the migrating population who stay in remote areas in the villages in scattered groups.

6.0 Policy and Legal interventions

There may be need for some legal interventions for the charcoal workers to avoid any exploitation by the traders or the officials. It would also be a good idea to have a list of all the workers being taken on contract by the trader along with the areas where they are

taken to insure availability of basic facilities on the sites. This may require making it mandatory by the labour department or the relevant departments and is an issue that can be taken at a policy level. The panchayats can be involved by making it mandatory to have a list of all the charcoal workers in the village, as this is a specialized occupation not undertaken by everyone.

Other policy level interventions would include allowing the use of wasteland for undertaking such economic activities by taking the panchayat into confidence. There are areas where Prosopis is perceived as a threat but at the same time there are also areas where systematic cutting and development of Prosopis can be undertaken. In areas that have vast unused tracts of wastelands, it can be leased to group of charcoal workers as has been done by the Vadgam Cooperative in the Khambhat region. Systematic planting of Prosopis and their cutting can be promoted which will solve two problems. One provision of services, be it amenities, financial services etc would become easier. Second technical interventions in terms of improved kilns, machineries will become easier as permanent structures can be set up on these lands.

7.0 Specific recommendations

Primary Stakeholders

- Organisations of charcoal workers

- Initiation of awareness building programmes. This may include information dissemination regarding the trade along with other social awareness aspects. The government regulations and the information about markets need to be spread among the charcoal workers.

- Initiation of social security schemes, savings and credit facilities for the organisations of the workers.

- Mobile Schools with properly worked out routes and time to remove accessibility constrains which has been one of the reasons for the low literacy levels and dropouts.

- Mobile health facilities to promote preventive health care along with first aid facilities. It may be clubbed together with the Mobile School facilities depending upon the regularity of the visits required in each cluster of charcoal workers.

- Medical kits with first aid facilities along with preventive facilities like gloves, boots, and masks can be another facility that can be provided to the workers. Though it may start as an intervention by agencies for sustainability it must be made mandatory for the traders to provide such facilities. Otherwise such practices will not be sustained.

- Wasteland Development programme to systematically grow Prosopis which on one hand will generate employment, income and ensure steady supply of raw material for charcoal making as well as in long run improve the quality of wasteland. This will also in future provide productive assets to charcoal producers for cultivation purpose.

Secondary Stakeholders

- The recent resolution has reduced the authority and role of the panchayat, the revenue department and the forest department by removing the need for permits and the transit pass. This is a progressive step and should be looked into as an opportunity that can be strategically utilized for the benefits of the charcoal producers.

- The role of panchayats should now be that of facilitator as its regulatory authority has been significantly reduced. In villages where social dynamics allows for participation of the charcoal making communities in the panchayat, the panchayat may act as a nodal agency linking the groups of the charcoal workers with the various schemes of government, and provide a platform for raising issues of the workers with regards to prices, amenities, etc.

  However this is an issue that would require very persistent and gradual intervention as the communities of charcoal workers belong to the least vocal groups of the society and their voices may never be allowed to be heard by a panchayat dominated (not necessarily headed) by communities who are economically and socially powerful and have their own priorities.

8.0 Conclusion

The people engaged in charcoal production process suffer abject poverty and eke out their existence in a hostile natural and socio-economic environment. The lack of alternative sources of employment and income forces them to live in subhuman conditions. Any effort to ameliorate their conditions has to be gradual, comprehensive and integrated as part of larger development efforts of CARE in the region.

The interventions to improve their quality of life must start with a basic change in understanding - **that they are not mere labourers producing charcoal but they are an important player in providing much needed energy resource, which supports economic and industrial development activities**. Their hard work contributes to the development process and hence they have right to a human quality of life.

The study opens a small window of opportunity to make a difference in the lives of 45,000 to 50,000 persons. Lets collectively take the challenge and make a difference.

Annexure 1: Case Studies

Case Study - 1

Name: Varjangji Tejaji Thakor
Occupation: Charcoal Worker
Village: Anternesh, Ta. Santalpur, Dist.: Patan

The family of Varjangbhai and Kankuben lives in Anternesh village, a remote village of Santalpur Taluka. They belong to the Koli Thakore community, one of the backward communities in the region. Varjangbhai's family comprises of six members. He has two sons and one daughter and one of the sons is married. Kankuben serves at the C.L.C. – Community Learning Centre set up by SEWA – Self Employed Women's Association. Varjangji's undertakes agricultural activity in his own small piece of land. However, the land is insufficient to meet the needs of the family and Varjangji and his family have to additionally work as labourers in agriculture, charcoal making and salt work activities.

Varjangji owns 5 bigha of land. He is involved in agriculture activity in monsoon season. In winter season, his family goes to the nearby saltpans to work as labourers in the salt work. Most of the family members are involved in the charcoal making activity during summer season. The annual income of the family is approximately Rs. 20,000. Of the total annual income, the family earns Rs. 6000 from Charcoal making. Charcoal making is thus one of the major sources of income for Varjangji's family.

Varjangji and his family produce charcoal on their own land as well as on other private land of the village. The Male members of the family usually do the difficult tasks of the charcoal making activity such as, cutting the Prosophis and cleaning the land. The female members on the other hand get engaged in comparatively less difficult work, such as, removing thorns, fetching water for the kiln etc. The Male members work from 8 a.m. to 5 p.m. while women members work from 11 a.m. to 5 p.m. The family sells the charcoal produced, to the local charcoal traders. They earn Rs. 60 from one sack of Charcoal.

The SAVE team met Varjangji twice during their visit to Anternesh village. Regarding the charcoal production activity in the village, Varjangji says, "Locally no other occupation is more viable than charcoal making. For salt work we have to walk for miles and in turn don't get sufficient income. As the village is situated closer to the Little Rann of Kutch, the village land is not very fertile and any agricultural activity fetches a meager income in comparison to the hard inputs. Charcoal making is less tedious and the income from the same is higher, when compared to other occupations in the village."

Varjangji further adds, "As far as charcoal making activity is concerned, we face two major problems. The first problem is related to the local forest department, which does not allow us to cut Prosophis. The second problem is regarding the non-availability of adequate information pertaining to the legalities of charcoal selling process. Due to this we have to sell the charcoal to local traders at very cheap rates. If these two problems could be tackled properly then probably we can earn more money from the charcoal making activity." Varjangni believes that the conversation with the SAVE team on the charcoal making activity has increased his understanding and knowledge on the legal aspects of the trade and from now on he would try to get permit for charcoal selling.

Case Study - 2

Name: Gabhaji Thakore and Amriben Gabhaji Thakore
Occupation: Charcoal worker
Village: Gujarwada, Taluka: Sami, District: Patan

During the third field visit, the SAVE team met Gabhaji Thakore on the way to Gujarwada village of Sami Taluka. Gabhaji Thakore and his wife Amariben were cutting Prosophis for Charcoal production. The SAVE team stopped to have a conversation with them. During the conversation, the team came to know that Gabhaji and Amariben belong to the Koli Thakore community and live in Gujarwada village. With four children, the total members of Gabhajibhai's family are six. Their children stay at home when they go to cut the Prosophis.

Gabhaji has 7 acres of land. In monsoon season, he does agriculture and agricultural labour activities. During winter and summer months, he and Amriben get engaged in charcoal production process. He gets credit from local trader of the Gujarwada village. Usually the credit amount given is Rs. 500 for one couple. His total annual income is around Rs. 12,000 of which, the total annual income from charcoal production is Rs. 5,000. He has a debt of Rs. 3000 to grow cotton in his farm.

"Since I was not fortunate enough to study due to work, at least my children should not be deprived of education."

Gabhaibhai and Amriben make charcoal from 9 a.m. to 6 p.m. They take their meals and water from home and work tirelessly during the entire day. They cut Prosophis from other people's private land and therefore they need to uproot the entire Prosophis shrub. Cutting the Prosophis along with its roots demands a lot of hard work. They have to face severe physical strain and at sometimes injuries while cutting Prosophis. Gabhajibhai says, "We are so tired after the entire day's work that we get body ache in the evening and are unable to do any work after reaching home."

The husband-wife duo returns home late in the evening. Till the time they are away, their elder daughter Asha takes care of her small brothers and sisters. Asha studies in 1st standard. Gabhaji wants all his children to study. He says, "I am doing this work because I did not get an opportunity to study. So I am keen that the schooling of my children should not be stopped due to charcoal making. Since I was not fortunate enough to study due to work, at least my children should not be deprived of education."

Gabhaji is involved in charcoal making activity since the past 20 years. He does not know about the legalities of the charcoal selling process. He is also not aware about the permit required for charcoal making process. Till know he was not stopped for cutting of wood for charcoal making. He is sure that if one cuts Prosophis in private land or village revenue land, the forest officers will not stop him to do so. Gabhajibhai is seriously worried about the decreasing numbers of Gando Bawal trees. He says, "If we don't have sufficient number of Prosophis on our land, we will be forced to migrate in search of other options of livelihood. Migration would in turn create health and education problems for my family."

Case study - 3

Name: Sureshbhai Dave
Occupation: Agriculture and former Chrcoal trader
Village: Gujarwada, Taluka: Sami, District: Patan

The SAVE team met Sureshbhai Dave in Guajarwada village of Sami Taluka. After learning of the objective of the SAVE team's visit to the village he was eager to help the team by giving valuable inputs regarding the nitty-gritties of charcoal trade. Sureshbhai presently works as a farmer but was engaged in the charcoal trading business prior to taking up agricultural activity. Eventually, he left the charcoal business as he gradually became aware of the loopholes of the business which he narrated to the SAVE team.

He informed that the Forest Department, along with other Government Agencies, initiated the plantation of Prosophis in Gujarwada village and surrounding villages as part of the afforestation activity. The Gram Vikas Nigam(GVN), an agency of the Government of Gujarat, was involved in implementing the Watershed Development Programme proposed by the D.R.D.A. Under the Watershed Development Programme, the GVN planted Gando Bawal in the common village land. When the Prosophis was big enough, it was sold to the local panchayat through auction.

"Charcoal trading is one of the most corrupt business. Only big traders with good political nexus benefit from the trade and that too at the cost of the exploitation of charcoal workers and charcoal collectors at village level."

According to Sureshbhai, small traders like him or the charcoal workers of the village have no say in the auction process. Since a trader has to deposit Rs. 50,000 to Rs. 1,00,000 to participate in the auction process, only big traders with good political connection are privileged to take part in the auction process. As the trader gets the contract to produce charcoal from the Prosophis, he hires local labour at very cheap rate. Due to the penetration of the evils of exploitation and corruption in the business, small traders like Sureshbhai would suffer and in turn were not able to sustain in the business. Therefore, he was forced to change his occupation.

The major reason for the shift in the occupation by people like Sureshbhai is primarily the constant decline in the population of the Prosophis. The frequent droughts and constant cutting of the Prosophis has led to the decrease in their number and availability. This has affected the collection of charcoal by small traders in and around the village. In order to earn good profit and to sell the produce in big markets like Morbi, the traders should be able to collect substantial quantity of charcoal. But the reduction in the number of Prosophis has also reduced the quantity of charcoal produced. The small traders therefore have to sell their charcoal in nearby places like Radhanpur. The big traders to whom the charcoal is sold manage to get a good price than the charcoal collector. Sureshbhai adds that, "Charcoal trading is one of the most corrupt business. Only big traders with good political nexus benefit from the trade and that too at the cost of the exploitation of charcoal workers and charcoal collectors at village level."

Sureshbhai decided to leave the charcoal business as he had his own land in Gujarwada village and thus had an option to earn. This year he is growing cumin in his farm and is hoping for a bumper crop for the season. His wife is the secretary of a Village Shelf Help Group (SHG) promoted by the Gram Vikas Nigam as part of the Watershed Development Programme.

Case study – 4

Name: Bhagabhai Gugabhai Thakore and Gulalben Bhagabhai Thakore
Occupation: Agriculture and Agriculture laboure (former charcoal worker)
Village: Rafu, Taluka: Sami, District: Patan

The family of Gugabhai and Gulalben resides in Thakorvas of Rafu village of Sami Taluka. They are seven members in the family, with four sons and one girl. Ten years back, Bhagabhai was in the charcoal making business. He had to stop this business due to severe health problems. Giving reasons for leaving the charcoal business, Bhagabhai says, "Taking up charcoal work in summer increases heat in your body. On one such hot summer day when I came back from my farm with sacks of Prosophis, I felt severe heat in my body. This led to vomiting. I found blood accompanied with vomiting. My health deteriorated and I recovered after 10 days of constant illness. After that bout of illness, I stopped the charcoal making work and chose to do other work. Thus, I stopped charcoal making activity since 10 years."

Bhagabhai was able to abandon charcoal making activity because he had the options to earn money from activity other than charcoal making. Bhagabhai has an agricultural land of 25 bigha. He cultivates this land either on his own or through partnership. He is able to produce 10 – 15 Mann of cotton from the land in monsoon. In winter and summer season he goes to Gondal town of Saurashtra region to work as an agricultural labourer in Groundnut crop. His eldest son Labhubhai is a handicap and does tailoring work at home. Bhagabhai's family is able to earn an annual income of Rs. 20,000. Bhagabhai agrees that he was able to leave the charcoal making activity because he has other stable sources of income. Had Gugabhai not have the options, he would have still continued with the drudgeries of the Charcoal making activity.

"Now I don't desire to once again make my hands black in charcoal making business. Not only I, but even my sons would never do this work in future."

Explaining the major problems involved in charcoal making in Rafu village, Gugabhai says, it is mostly the Thakore community – 20 to 30 families, of the village who are engaged in the charcoal making activity. Due to constant cutting of Prosophis since the past many years, their number is constantly declining. If the villagers try to get Prosophis from forestland, the local forest authority does not allow them to do so. As a result, very few people opt for charcoal making work in the village. This has forced some of the charcoal workers to migrate from the village in search of work to other parts of Gujarat.

In answer to the question that whether he would opt for charcoal making in future, Gugabhai says, "Now I don't desire to once again make my hands black in charcoal making business. Not only I, but even my sons would never do this work in future."

Case Study - 5

Name: Narsangbhai K. Rathod
Occupation: Sarpanch and Charcoal trader
Village: Dhama, Taluka: Patadi - Dasada, District: Surendranagar

Narsangbhai Rathod is the sarpanch of Dhama village and a big charcoal trader of Surendranagar district. He is a district level B.J.P. leader. His wife is a member if the Jilla panchayat of Patan district. Narsangbhai is in the charcoal making business since the past 20 to 25 years. He runs his charcoal business in Surendranagar district as well as in Kadi and Dholka talukas of Ahmedabad district. In Surnedranagar district, his work is concentrated in Gosana and Kochana villages of Patadi-Dasada taluka. (the SAVE team visited both sites of his charcoal making work) In Gosana village, Sadabhai Thakore is his local representative to execute his work while in Kochana his younger brother Hirabhai Rathod is in charge of the charcoal making process. Apart from charcoal making, he has vast land to practice agricultural activities. He owns a four -wheeler in addition to two – wheeled vehicles.

Narsangbhai furnished details of the charcoal making work in his area and according to him, "In Surendranagar district, it is mainly the Thakor community that is engaged in the charcoal making work. These days the Charcoal market in Morbi town is at its peak, due to which there is a rise in the charcoal production activity. It is only when we can earn more that we can pay better wages to the labourers. Some of the Thakors are able to earn well in the charcoal making activity. However, their main problem is that they do not save their earnings and fall prey to the social evils like gambling and consuming liquor. The result is that despite putting in years of hard work, the economic condition of these Thakors has not improved."

"In our area there is no interference by the Forest Department. One of the reasons being that most of the big charcoal traders in our region has good political connections. The forest officers do not dare to go against the charcoal traders and if they do dare, then we teach them a lesson."

About the role of the Forest Department in charcoal production and selling process, Narsangbhai says that, "In our area there is no interference by the Forest Department. One of the reasons being that most of the big charcoal traders in our region has good political connections. The forest officers do not dare to go against the charcoal traders and if they do dare, then we teach them a lesson." Narsangbhai hopes that the now Government Rule (GR) regarding the allowance of Prosophis cutting from revenue land will help to reduce interference by foresters and will benefited the charcoal traders and in a way charcoal workers.

About the charcoal selling process Narsangbhai says, " The biggest charcoal market is in Morbi. After the legal process is completed, the charcoal is taken to Morbi by truck. On every truck the rate of transport, labour and the process of getting permit is same. We try to load more charcoal in every truck to get maximum benefit per truckload. This helps to reduce the transportation cost and give more income per truck. The charcoal is sold to that mediator who offers to give higher price per sack of charcoal."

Commenting on the future of the charcoal business, Narsangbhai says, "I am engaged in this business since the last 20 – 25 years. Though charcoal production is at its peak, the Prosophis in the area is increasing and not decreasing. If there is good market for charcoal, the charcoal business will prosper in the future."

Case Study - 6

Name: Jay Dashama Charcoal Unit
Occupation: Charcoal production through SHG
Village: Tikar, Ta. Halvad, Dist. Surendranagar

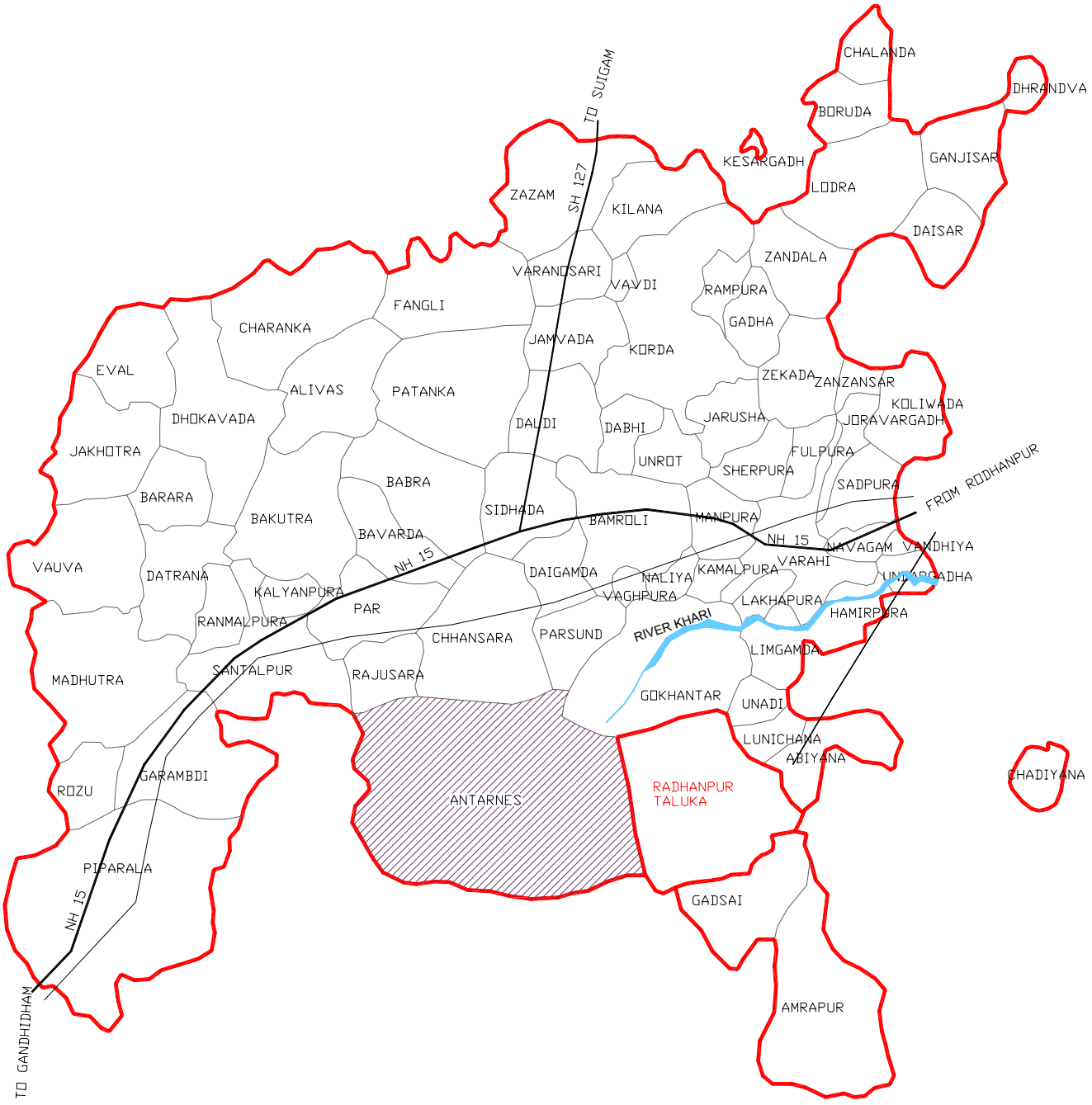
Tikar is a big village situated near the Rann of Surendranagar Taluka. Tikar was totally devastated during the earthquake of 2001. Dipak Charitable Trust, a NGO started its relief and rehabilitation work after the earthquake. The Trust is engaged in long-term development work in the village. At present the Dipak Charitable Trust has undertaken long-term livelihood programmes with a special focus on women. The Trust has facilitated Self Help Groups (SHGs) under the Swa-Shakti project of Government of India. Out of these, three SHGs have established Jay Dashama Charcoal Unit with an objective to promote charcoal making as a group livelihood activity, to increase economic standing of women in society and to make them finically independent. In Tikar village and its surrounding villages, Charcoal making is a major livelihood activity. Due to the stronghold of big traders, charcoal workers gets low returns for their labour. The women of the village are equal partners in the charcoal making activity, but they get very nominal income against their hard work. Jay Dashama Charcoal Unit has been established to prevent the exploitation of the charcoal workers.

A Committee of 11 women members manages the Jay Dashama Charcoal Unit with external support from the Dipak Charitable Trust. This committee buys the charcoal produced by women members of the Dashama Charcoal Unit on fixed standard rates. The rates are decided by the Dashama charcoal unit, which is usually priced at Rs. 5 to Rs. 10, more than the market price. This leads to a positive impact on the local charcoal market, as the local traders also have to increase their rates. This in turn helps the local charcoal workers. The Committee members sell the charcoal produced to the market in Morbi on their own. The Dipak Charitable Trust provides legal and credit support to the Jay Dashama Charcoal Unit. The committee members also get a strong support from their family members.

"The local traders consider us to be hurdle in their trade. They try to interfere in our work in every possible way to discourage us. But we fearlessly sell our charcoal to Morbi treading every difficulty that comes our way."

Samjuben, the Secretary of Dashama Charcoal Unit narrates the problems to the Team, " Getting permit to sell our charcoal is the biggest problem that we face. We women do this activity as a group activity and therefore we expect help from the local panchayat as well as from the government. However we do not get any such support to sell our collected charcoal. The Talati and Mamlatdar had promised to help us, but these were only verbal promises and nothing official has happened in this regard." In addition, Samajuben says, "Our second problem comes from local charcoal traders. The local traders consider us to be hurdle in their trade. They try to interfere in our work in every possible way to discourage us. But we fearlessly sell our charcoal in Morbi market, treading every difficulty that comes our way."

Annexure 2: Maps



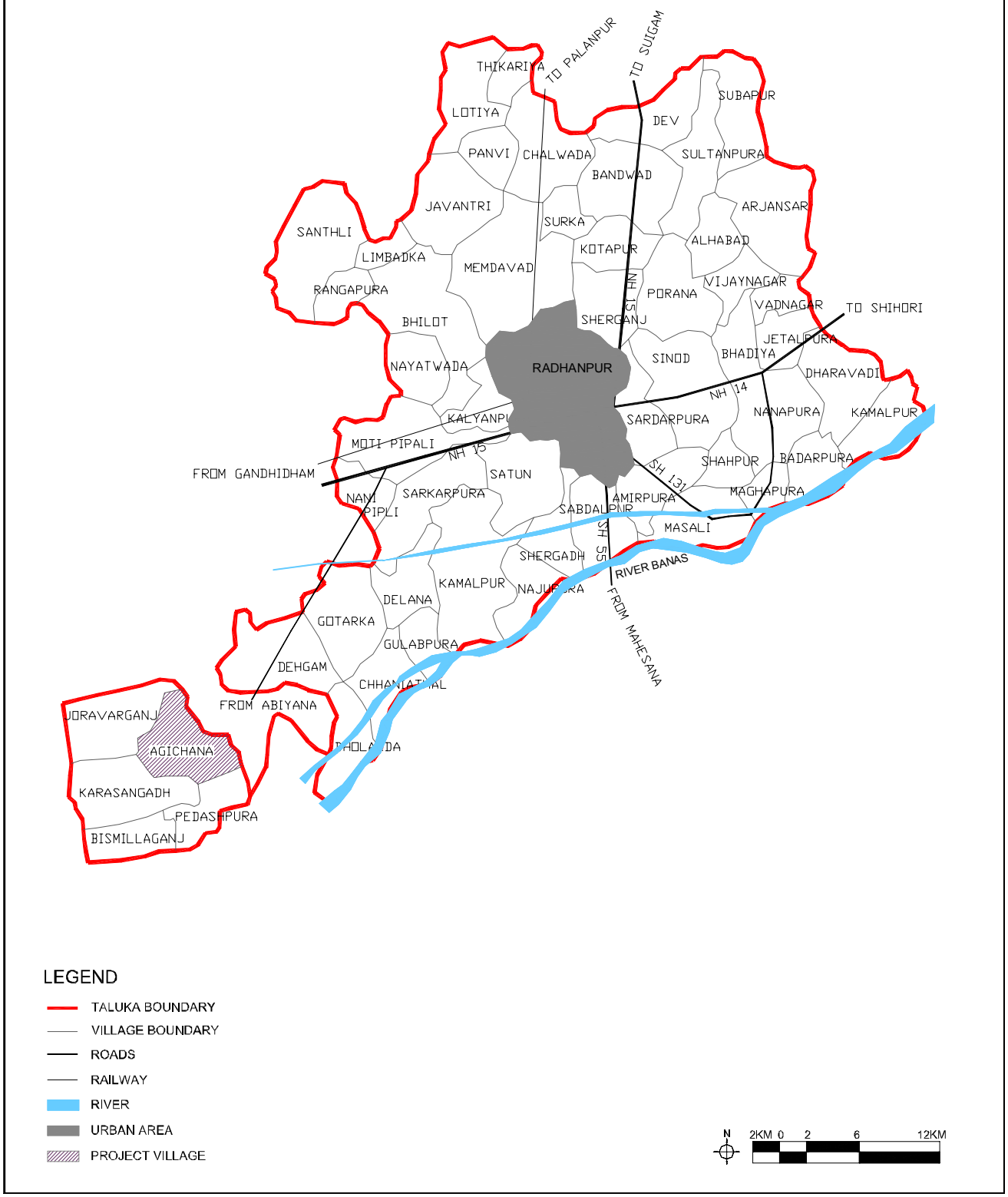
LEGEND

- TALUKA BOUNDARY
- VILLAGE BOUNDARY
- ROADS
- RAILWAY
- RIVER
- URBAN AREA
- PROJECT VILLAGE

N 2KM 0 2 6 12KM

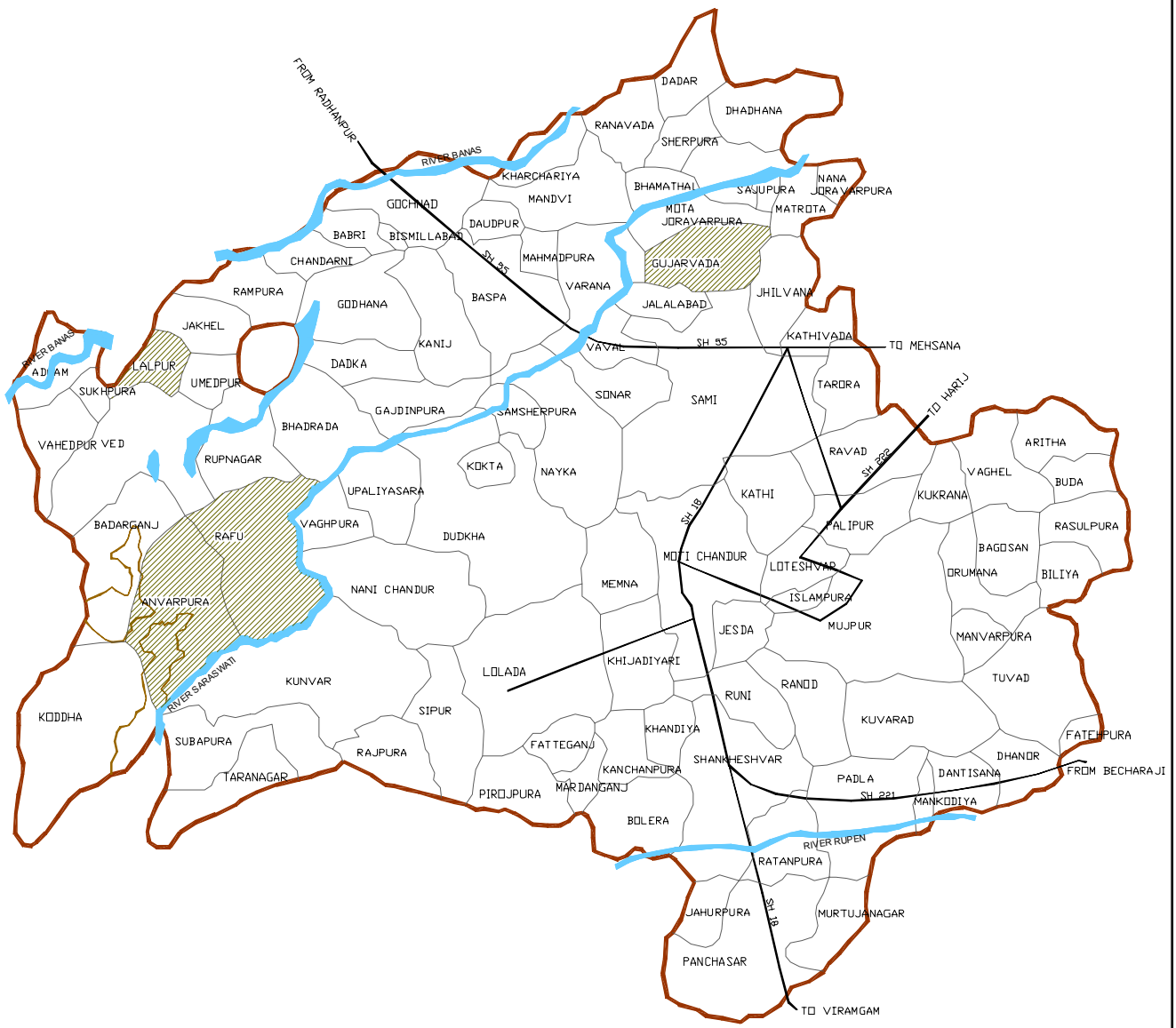
SANTALPUR TALUKA BASE MAP (PATAN DISTRICT)

MAP SHOWING VILLAGES COVERED UNDER CHARCOAL STUDY



RADHANPUR TALUKA BASE MAP (PATAN DISTRICT)

MAP SHOWING VILLAGES COVERED UNDER CHARCOAL STUDY



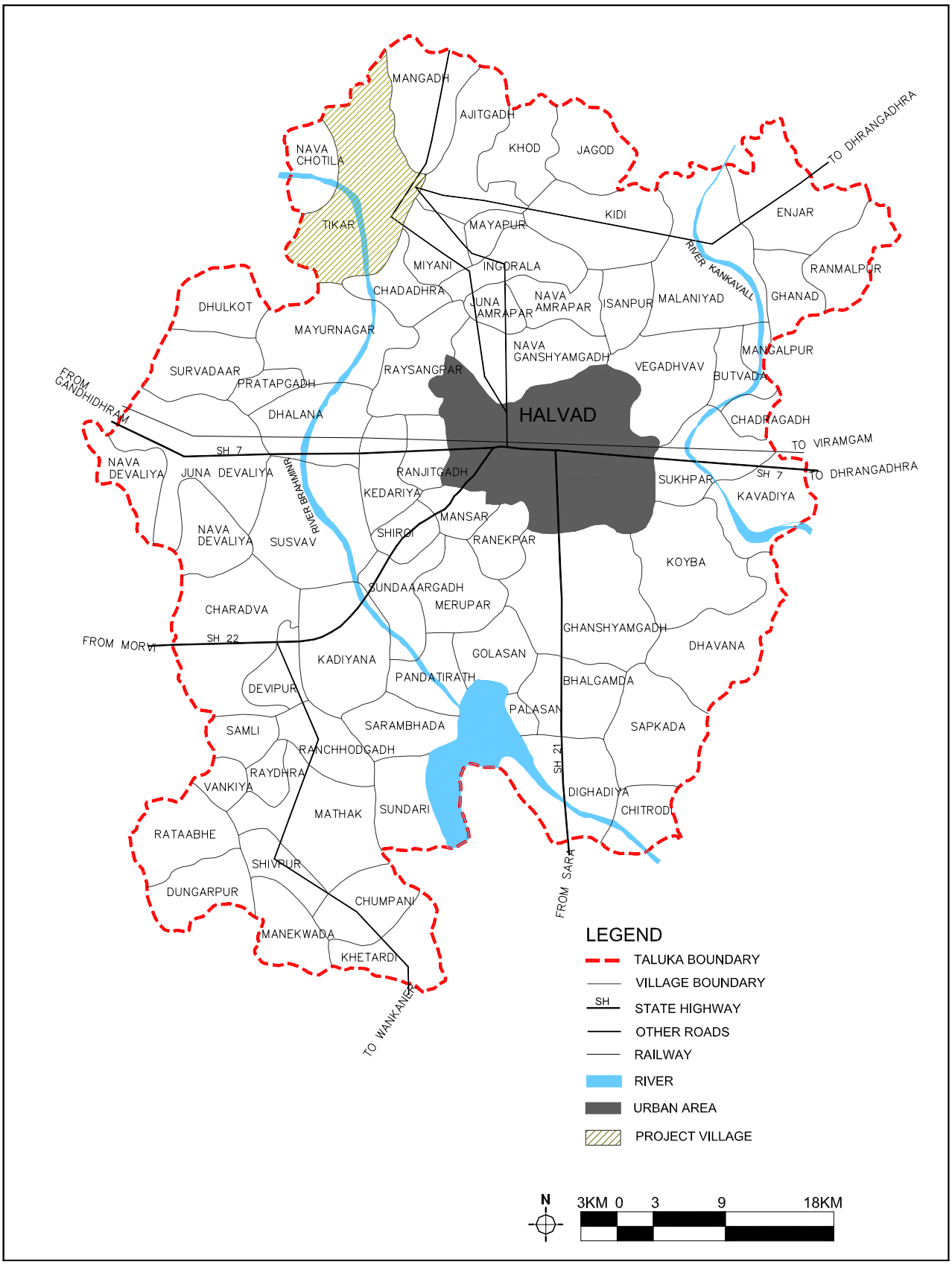
LEGEND

- TALUKA BOUNDARY
- VILLAGE BOUNDARY
- ROADS
- RAILWAY
- RIVER
- URBAN AREA
- PROJECT VILLAGE

N 2KM 0 2 6 12KM

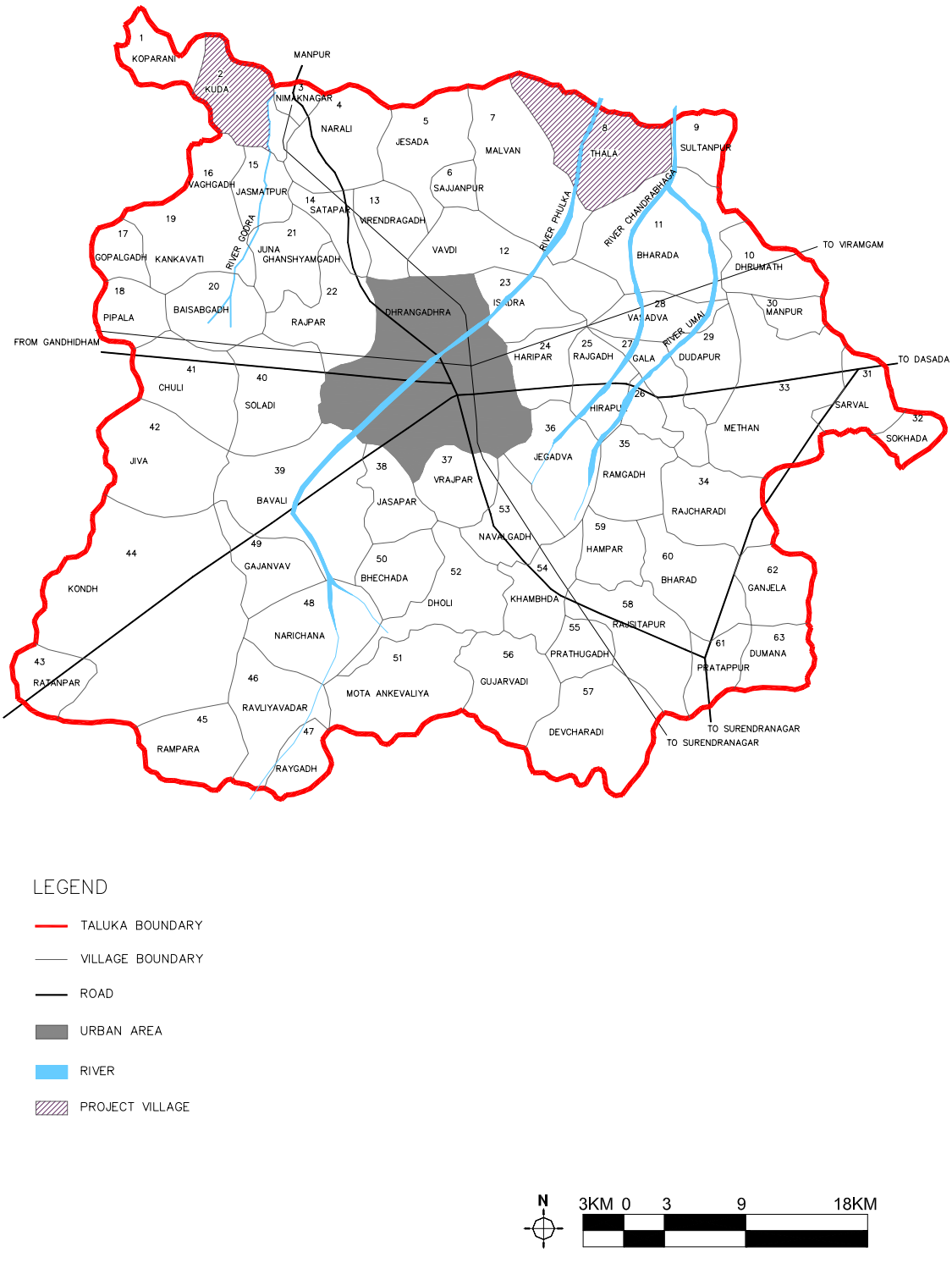
SAMI TALUKA BASE MAP (PATAN DISTRICT)

MAP SHOWING VILLAGES COVERED UNDER CHARCOAL STUDY



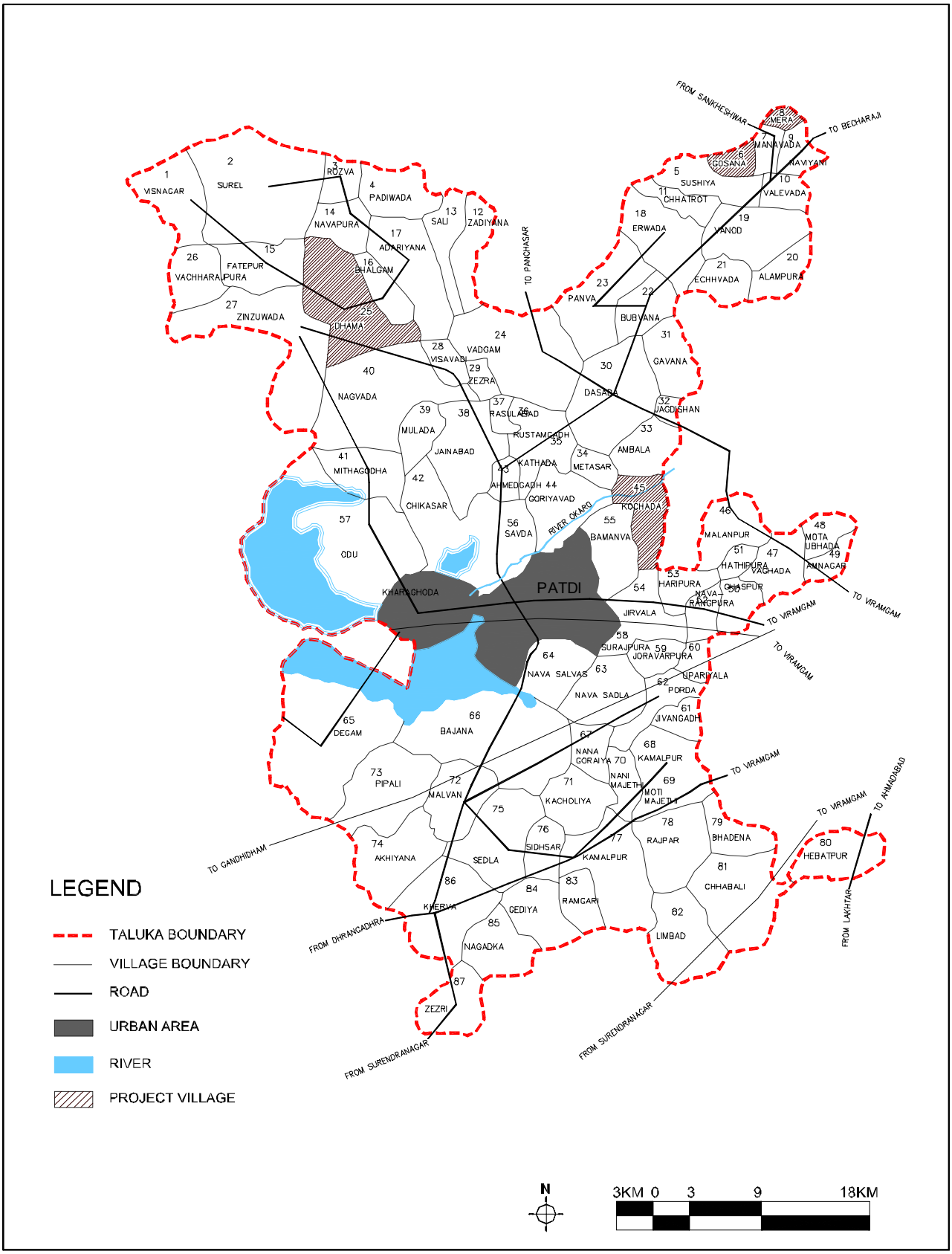
HALVAD TALUKA BASE MAP (SURENDRANAGAR DISTRICT)

MAP SHOWING VILLAGES COVERED UNDER CHARCOAL STUDY



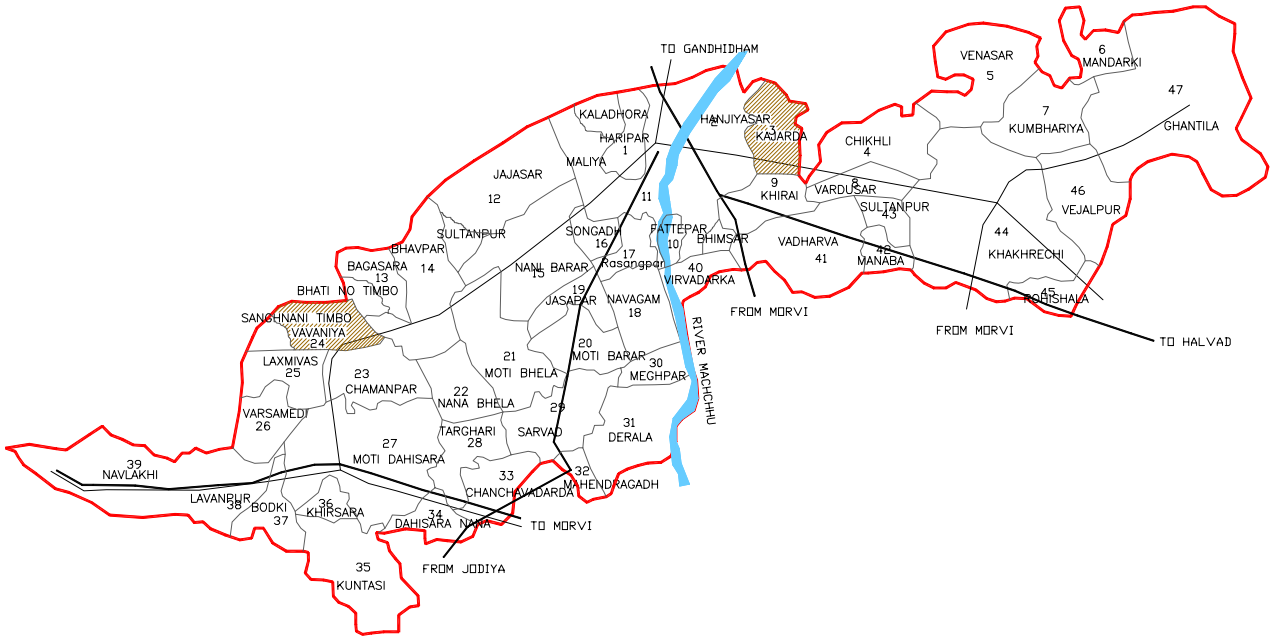
DHRANGADHRA TALUKA BASE MAP (SURENDRANAGAR DISTRICT)

MAP SHOWING VILLAGES COVERED UNDER CHARCOAL STUDY



PATDI-DASADA TALUKA BASE MAP (SURENDRANAGAR DISTRICT)

MAP SHOWING VILLAGES COVERED UNDER CHARCOAL STUDY



LEGEND

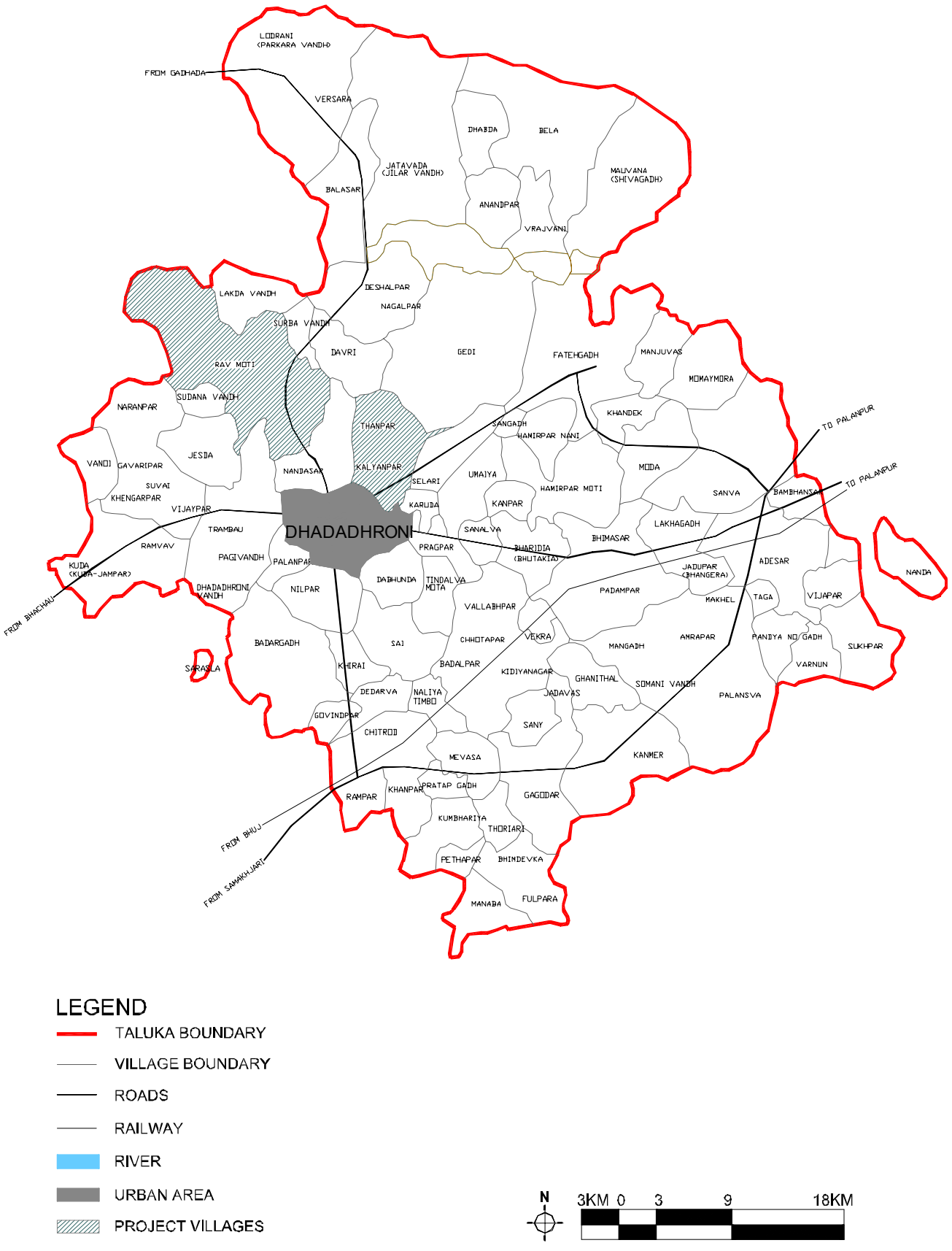
- TALUKA BOUNDARY
- VILLAGE BOUNDARY
- ROAD
- URBAN AREA
- RIVER
- VILLAGES COVERED UNDER THE PROJECT

N

3KM 0 3 9 18KM

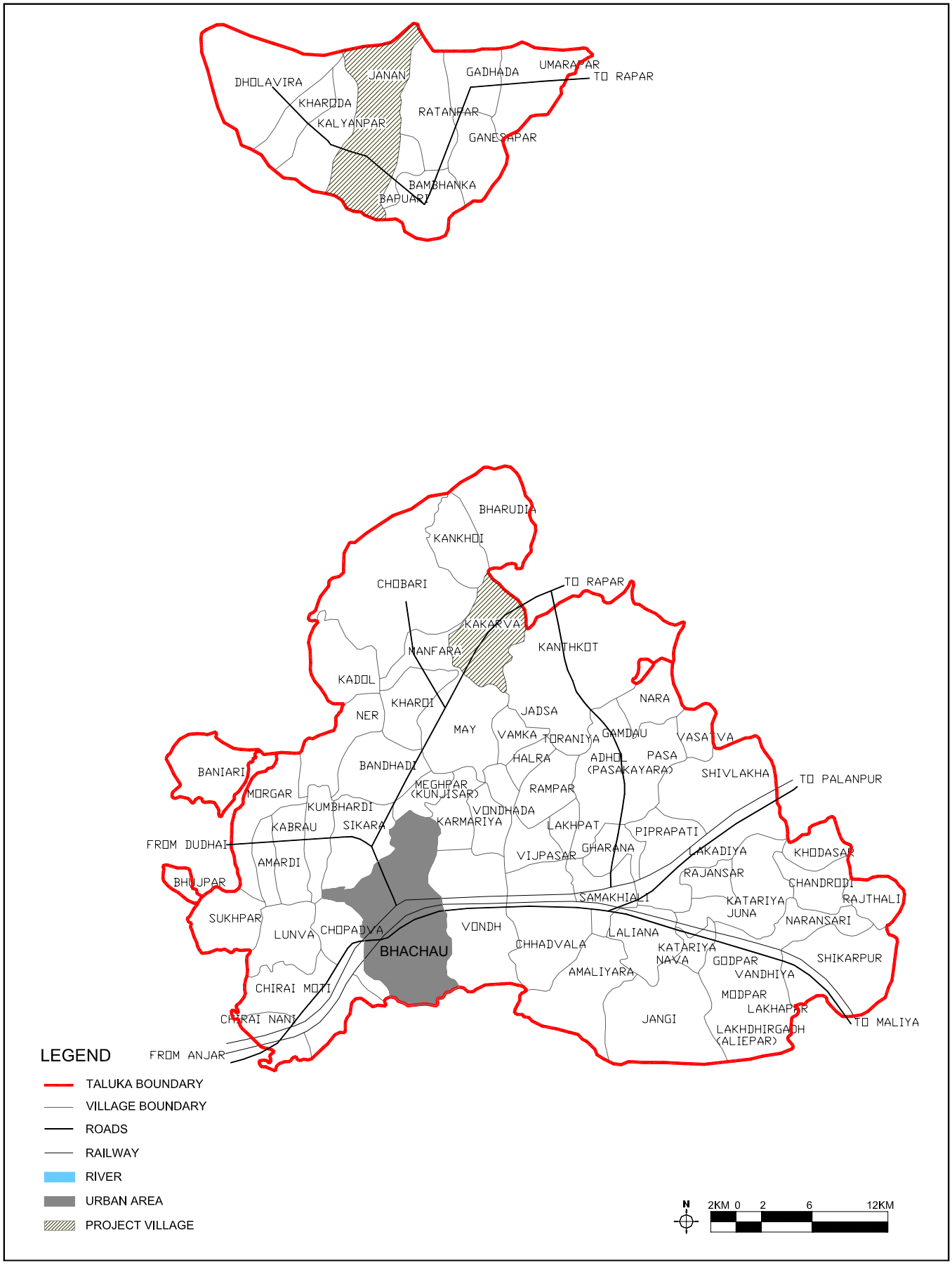
MAILYA TALUKA BASE MAP (RAJKOT DISTRICT)

MAP SHOWING VILLAGES COVERED UNDER CHARCOAL STUDY



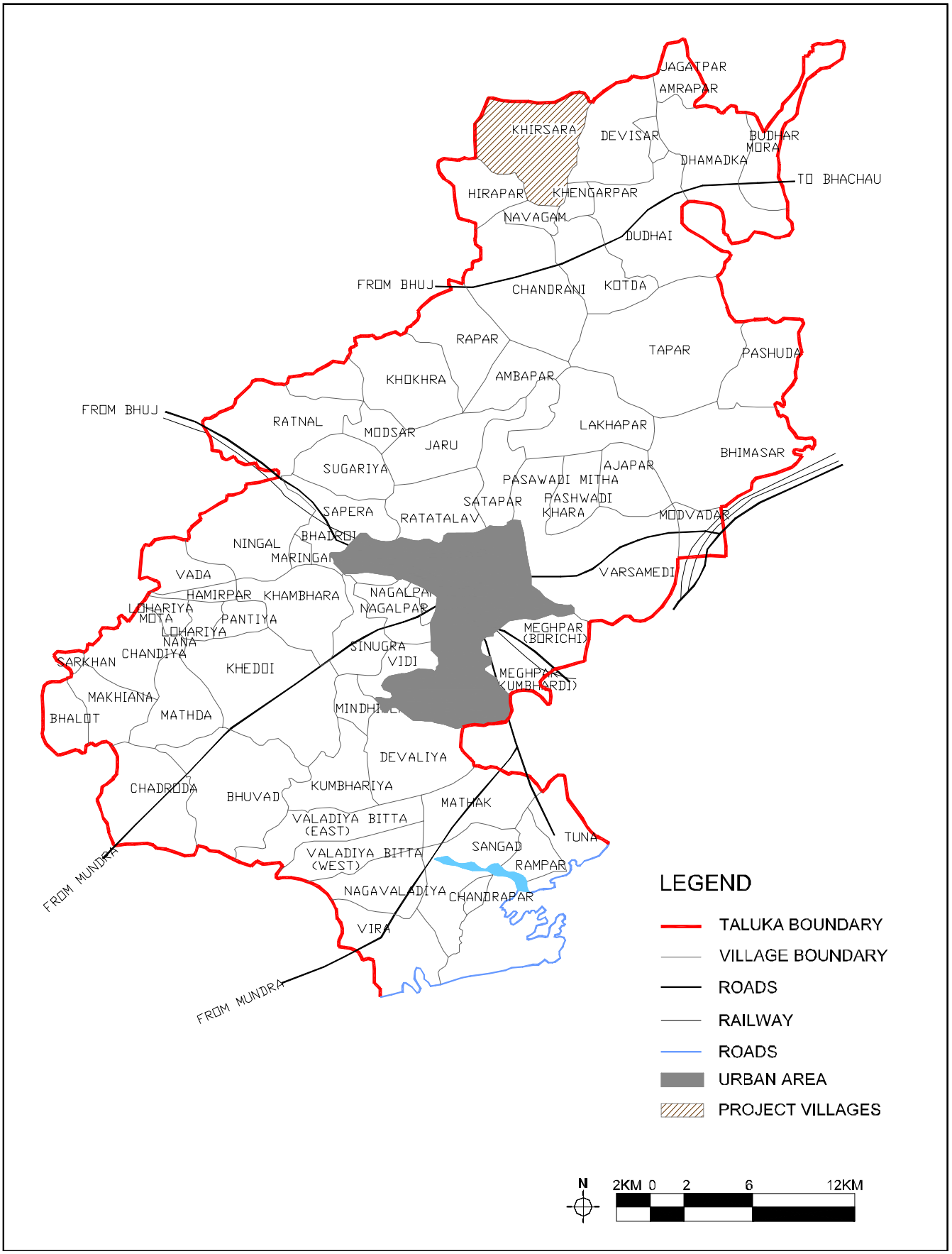
RAPAR TALUKA BASE MAP (KACHCHH DISTRICT)

MAP SHOWING VILLAGES COVERED UNDER CHARCOAL STUDY



BHACHAU TALUKA BASE MAP (KACHCHH DISTRICT)

MAP SHOWING VILLAGES COVERED UNDER CHARCOAL STUDY



ANJAR TALUKA BASE MAP (KACHCHH DISTRICT)

MAP SHOWING VILLAGES COVERED UNDER CHARCOAL STUDY

Annexure 3: Questionnaire

Charcoal worker's Study
Conducted by SAVE – Saline Area Vitalisation Enterprise
Questionnaire for Charcoal producing family

I. Primary Information

1.1 Field Investigator: _____ 1.2 Date: _____ 1.3 S. No. _____
1.4 Village: _____ 1.5 Taluka: _____ 1.6 District: _____
1.7 Name of Respondent: _____

II. Social Information

2.1 House details: 1. Rented 2. Own House 2.2 Type of House:_____
2.3 Caste: _____ 2.4 Religion: _____ 2.5 No. Family members: _____
2.6 Family Profile:

Sr. No	Name of Member	Sex	Age	Relation to the Respondent	Education	Occupation	
						Primary	Secondary
1							
2							
3							

III. Economic Information

3.1 Do you have agricultural land 1.Yes 2. No

3.2 Crops: _____ 3.3 Crop production: _____

3.4 Do you have irrigation facility 1. Yes 2. No

3.5 Do you have livestock? 1. Yes 2. No

3.6 If yes, do you practice Animal Husbandry 1. Yes 2. No

3.7 Details OF livestock

1. Cow:
2. Bullock
3. Buffalo
4. Goat
5. Sheep
6. Donkey
7. Horse
8. Poultry
9. Other _____

3.8 Occupation (Tick the Applicable)

1. Salt worker
2. Salt laborer
3. Charcoal worker
4. Fisheries
5. Artisan
6. Agri Laborer
7. Private service
8. Other _____

3.9 Household Income through occupation

Sr. No.	Occupation	Months		Annual Income	Family Members involved
		Production	Selling		
1					
2	**Total**				

III (B). Charcoal Production

3.10 Where do you produce charcoal?
1. Within the village 2. Nearby village 3. Far from village 4. Other

3.11 Years of charcoal production: _____ Year

3.12 Which type of Prosophis are you using for charcoal production? _____

3.13 Where do you get row material for charcoal production?

1. Own land
2. Other's private land
3. Waste land
4. Pasture land
5. Forest land
6. Land of other Panchayat

3.14 Purpose of cutting the Prosophis:

1. Land cleaning
2. Prosophis production
3. Prosophis cycle creation
4. Charcoal production
5. No objective
6. Other _____

3.15 Condition of land where you are cutting Prosophis? (In three-year duration)

1. Not available 2. Increasing 3. Decreasing

3.16 Days of psosophis cutting for one kiln: _____ days

3.17 Are you family members involved in production process? 1. Yes 2. No

3.18 If yes, No. of Family members involved: _____
1. Male: _____ 2. Female: _____ 3. Children (Below 14 years): _____

3.19 No. of working hours:
1. Male: _____ 2. Female: _____ 3. Children (Below 14 Years): _____

3.20 Other needs for one kiln (Except Charcoal): _____ (Consumption: _____)

3.21 Tools for charcoal production: _____

3.22 In which Season you produce charcoal? 1.Winter 2. Summer 3. Monsoon

III(C). Charcoal Production (Outside)

3.23 Where do you go for charcoal production? 1._____2. _____3. _____

3.24 From how many years? 1. _____ 2. _____ 3. _____

3.25 Does your family go outside the village for Charcoal Production? 1 Yes 2 No

3.26 If yes, Members who go out with you?
1. All members 2. Only male members 3. Husband & Wife

3.27 Season of going outside: 1. Winter 2. Summer 3. Monsoon

3.28 Regularity of allowance:
1. Daily 2. Weekly 3. Monthly 4. Seasonal 5. Quantity Supplied

3.29 Regularity of Payment:
1. Daily 2. Weekly 3. Monthly 4. Seasonal 5. Quantity Supplied

3.30 Who takes you outside?
1. On our own 2. Village trader 3. Trader from outside 4. Others _____

3.31 If 1, 2 than what are the terms of contract?
1. _____
2. _____

3.32 Do you go out with the same contractor? 1. Yes 2. No

3.33 If no, reason: _____

3.34 Do you have a pre-production Contract? 1. Yes 2. No

3.35 Do you take Credit from the Contractor? 1. Yes 2. No

3.36 If yes, of what amount (Range) _____

3.37 Implications of taking credit:
1. On price: _____
2. On labour: _____
3. On working days: _____

3.38 Market price of charcoal: _____ Rs.

3.39 Price of charcoal given by trader: _____ Rs.

3.40 Facilities given by contractor during work:
1. Accommodation: _____
2. Health: _____
3. Water and Sanitation: _____

4. Transportation: _____
5. Others: _____

III (D). Sale of Charcoal

3.41 Do you know about the market available for the charcoal? 1. Yes 2. No

3.42 If yes, where is the market? _____

3.43 Buyer of Charcoal (Name of trader and his village/City):

1. _____ 3. _____
2. _____ 4. _____

3.44 Have you sold charcoal in retail: 1. Yes 2. No

3.45 If yes, selling price: _____

3.46 Place: _____

3.47 The average weight of one sack of charcoal: _____

3.48 Market selling price of charcoal:

Sr. No.	Type of market	Selling Price (Rs.)
1	Retail	
2	Wholesale	

IV. Legalities of charcoal production process

4.1 Are you aware of the legal Processes? 1. Yes 2. No

4.2 Have you ever applied for permit of Charcoal Production? 1. Yes 2. No

4.3 If No, Why?

1. Monetary reasons 3. Stronghold of traders 5. Others _____
2. Lack of information 4. Corruption

4.4 If yes, how many times you got permit? _____

4.5 To whom did you apply for permit?

1. Panchayat Office 2. Talati/Mamlatdar Office 3. Forest Office

4.6 What response did you get from that person?_____

4.7 Have you ever been penalized for Charcoal Production 1. Yes 2. No

4.8 If yes, by whom: _____

4.9 Reason: _____

4.10 Which are the legal problem you face in charcoal production and marketing?

i. _____
ii. _____

V. Education & Health aspects of charcoal process

5.1 Do you send your children to school? 1. Yes 2. No

5.2 Is their education interrupted due to charcoal production process? 1. Yes 2. No

5.3 If yes, has any of your child left the school due to charcoal production work?

1. Boy: _____ 2. Girl: _____

5.4 Have you any accidents during the charcoal production process? 1. Yes 2. No

5.5 If yes, which types of accidents are you facing?

1. Burn 2. Thorn 3. Cuts 4. Wounds 5. Other _____

5.6 Have you any diseases during the charcoal production process? 1. Yes 2. No

5.7 If yes, type of diseases?

1. Normal 2.Severe 3. Both

5.8 If normal, which are they?
1. Cough/Cold 2. Throat problems 3. Body ache 4. Stomach problem

5.9 If severe, which are they?
1. T.B. 2. Bronchitis 3. Eye diseases 4. Severe throat problems 5. Others _____

5.10 Which are the preventive steps you taking? _____

5.11 Have you ever gone to doctors due to these diseases? 1. Yes 2. No

5.12 Have you ever been hospitalise? 1. Yes 2. No

5.13 Given a choice and similar income will you go for Charcoal as an Occupation?
1. Yes 2. No

5.14 If Yes, Reasons
1. _____
2. _____
3. _____

5.15 If No, Reasons
1. _____
ii. _____
iii. _____

5.16 How can the Charcoal Occupation be promoted to yield more income
1. _____
2. _____

Annexure 4: Checklist

Check List – Charcoal Workers' Study, CARE India

For Villagers

1. General details of the village-Demography, Socio-economic Status, Earthquake Affected etc.
2. Identification of Communities and People involved in Charcoal Production?
3. Social and Economic status of these Communities?
4. Respect/Dignity for these communities.
5. Important Occupations of the Village?
6. Importance of Charcoal in the occupational pattern?
7. Seasonality of Charcoal Production?
8. Role of producers, traders, Government-Forest Department Panchayat in the Charcoal Trade?
9. Condition of the Charcoal Workers-Health, Education etc
10. Process of Charcoal Production-From Procurement of Raw Material to the marketing.
11. What is the role and responsibilities of women during the charcoal making process?
12. Awareness regarding the government policies of the trade?
13. Use of Charcoal as a fuel within the village?

For Government officials

1. Government Regulatory requirements?
2. Government Details regarding the Charcoal Trade, villages identified etc.
3. Permissions required for undertaking procurement of wood, Charcoal production, Transportation and sale? Why?
4. Government records regarding number of permits/licenses granted?
5. Number of police cases / FORs for braking regulations?
6. Government intent regarding Prosophis and Charcoal?
7. Any plan of Government for development of charcoal workers?

For Charcoal traders

1. From how many years are you engaged with this business?
2. What is your business area-Production and Market?
3. What are the potential areas of future expansion of your business?
4. What types of charcoal are you selling? (Quality and Price)
5. Value Addition if any to the Charcoal procured?
6. Trade channel.
7. Margin at each stage and problems at each stage?
8. Transport arrangements and Regulations.
9. Main problems faced by charcoal making communities.
10. His perception about charcoal trade.
11. Any welfare activity carried out by him for charcoal workers?

For charcoal workers

1. Total process of Charcoal making
2. Legalities of charcoal production process.
3. Costing of charcoal making process
4. Technology – Equipments, Process of charcoal making, protections from hazards
5. Main hazards of charcoal production process
6. Marketing of produced charcoal
7. Price fluctuation, Market prices – Wholesale and retail, market place, style of selling
8. Gender, health and Education issues.
9. Inter community relationship with other communities.

ANNEXURE 5: News paper articles and clippings

News paper articles and Clippings REGADRING
Prosophis and Charcoal

Incentive Schemes for the period 1995-2000 include Capital Investment Subsidy to small and tiny industries and Sales Tax Incentives to all industries with the list of ineligible industries pruned down. Charcoal industry falls under the banned industries list of the Gujarat Industries incentive Policy 1995-2000.

List of banned industries and areas from incentives
Banned Industries

- **Producing of firewood and charcoal.**
- Decorticating, expelling, crushing, roasting, parching, frying of edible oil seeds, viz. Groundnut/Sisham, Rapeseed, Mustard, Sunflower, Soyabean, Safflower, Kardi, Nizar, Palmoil, Coconut, Cottonseed etc., and refining, colouring/decolouring and scanting of oil (except in co-operative sector and oil Ghani).
- Solvent extraction of oil from edible seed/edible oil cake processing and/or hydrogenation of edible oil (except in co-operative sector).
- Thinner and French Polish, Kakab and Gadaku. Dairy milk powder and other manufacturing products starting from milk (except in co-operative sector). However mere pasteurization and sterilization of milk will not be eligible.
- Mining.
- Electricity Generation (except captive electricity generation).
- Cottage and village industries falling within the purview of Khadi and Village Industries Board, Khadi and Village Industries Commission and industries falling within the purview of coir/silk handloom handicrafts board and units set up by self-employed workers and artisans etc. which are covered under separate scheme of assistance.
- State and Central Public Sector undertaking.

'GANDO BAVAL' OVERTAKES 'NEEM' AS STATE'S NO. 1 TREE

TIMES NEWS NETWORK [SATURDAY, DECEMBER 04, 2004]

GANDHINAGAR: The well-known wild weed, Prosophis juliflora or 'gando baval,' as is locally known, has outstripped all other tree species Gujarat in sheer numbers and coverage.

A recent two-volume report published by the state forest department, 'Tree Wealth of Non-Forest Land Gujarat,' the first-ever tree census in the state, says that there are 4.31 crore 'gando baval' trees — a tree species brought to India from abroad before Independence. The total tree population in Gujarat outside the forests is put at 25.1 crore trees. **Though there are concerns that this species is growing at the cost of other indigenous trees, the forest department report does not consider this as something harmful.** A zone-wise analysis suggests that most of the 'gando baval' — 3.12 crore — is found in the Saurasthra-Kutch region. Surendranagar district has 'gando bavals' as 62 per cent of its tree population, Rajkot 30 per cent, Jamnagar 19 per cent, Junagadh 34 per cent, Porbandar 45 per cent, Amreli 54 per cent, Bhavnagar per cent, and Kutch 28 per cent. It is also not without significance that 'nilgiri' or eucalyptus — another foreign species which originated in Australia — dominate in Central Gujarat and South Gujarat with 1.35 crore and 65.04 lakh respectively, more than any other species.

What is surprising is that the 'gando baval' has replaced 'limda' or neem — which the report calls the 'Tree of the State' — as Gujarat's No. 1 tree. According to the report, there are 3.15 crore neem trees in Gujarat, 1.15 crore less than 'gando baval.' Instructions to uproot 'gando baval' seem to have been pushed to the backburner.

Now, the official report only seeks to project advantages of the wild weed. It says, "Gando baval's pods are being used as fuel, for cattle feed etc. This species can withstand extremely hostile climates and spreads very fast."

Further praising the wild weed, the report says, "It improves the soil quality by decreasing the salinity. People also make charcoal out of its stem and roots. Because of this alternative source, the pressure on other trees for fuelwood, has decreased considerably. Employment is also generated through coal-making. The species has also checked the advancement of Rann and acted as an shelterbelt in coastal areas."

Five years ago the government made a special allocation to uproot 'gando baval.' It even issued a notification allowing people to uproot it at will. But the report, on the contrary, takes pride in having reached the tree density of 14 trees per hectare in nonforest area.

Says G A Patel, member of the National Wildlife Board, "An origin of Mexico and Africa, 'gando baval' was brought to Gujarat by the princely rulers of Radhanpur and Kutch. Instead of achieving the desired aim of fighting desertification in Kutch and Banaskantha, it became a 'foreign invader.' It has destroyed Asia's unique, 3,500-km big Banni grassland in Kutch, as also other cultivable areas. It has spread its tentacles as far as Central and South Gujarat, affecting green areas."

Asian Age August 25, 2000
MLAs pin proposal *for Prosophis* charcoal

Charcoal mafia groups with MLAs to keep constructive, proposal at bay

Forest officials here have accused the state government of staving off the decision to give an "in principle" approval to the proposal of the Gujarat State Forest Development Corporation to produce charcoal from `G*aanda Baaval'* for the last five years due to involvement of about 25 MLAs who are "hand in glove" with the "charcoal mafia" believed to be against any regulation on cutting of the *ganda baval*.

A top forest official told *The Asian Age* that fuel needs of *35* per cent of the population in the state who use charcoal as fuel can be sufficed by the charcoal produced from *gaanda baaval*, but the state government is reluctant to give the final nod due to vested interests of politicians who have contacts with local contractors extracting the tree produce. "Local contractors are using their political clout to put the issue on hold," the forest officials said.

However, it seems that the murder of an ardent supporter of industry minister Suresh Mehta in Kutch by the charcoal mafia that had prompted him to hand over his papers to the chief minister was just the tip of an iceberg.

The Gujarat State Forest Development Corporation which is reportedly on the brink of collapse due to the handina over of 80 per cent of its activities of collection of non timber produce to the gram panchayat has pinned all hopes on the state government's response.

However, the state government has been sitting pretty on the proposal since the last five years and the last meeting held in September, 1999, chaired by additional chief secretary, forests and environment, P. Basu, additional chief secretary, revenue, and top forest officials has remained as unresolved as the previous ones.

"Things have refused to move forward due to lack of political will, as the proposal has been discussed threadbare for years and there is nothing more left to bedone," the official said.

The Prosophis has encroached upon large stretches of land in Kutch, Patan, Banaskantha, Surendranagar, Bhavnagar, Bharuch, Ahmedabad and Mehsana and in the areas adjoining the Gulf of Khambhat.

"In fact the unrestrained growth of *ganda baval* what is being perceived as a major problem in the state can be turned into a big advantage. Several countries are considering alternative sources of fuel and have reserved the growth of *ganda baval* to meet exigencies," the official said.

"The *ganda baval* has a tremendous genetic capacity and is an invading species which reproduces itself and its deep roots suck away all underground moisture making it difficult for other trees in the area to survive" the official said.

In fact the Prosophis has degraded pasturelands and forests and destroyed several species of grass in the Banni grasslands and other places, the official claimed.

The Gujarat Ecological Commission had also in its report recommended handing over the management of the *Prosophis* to the Gujarat State Forest Development Corporation.

The Gujarat State Forest Development Corporation proposal involves regulation of the natural resources and engaging the financially backward people in the implementation of the scheme and is expected to facilitate an estimated nine lakhs human days of labour in a year. The proposal includes production of 10 lakhs bags of coal through state-of-the-art machinery and an annual turnover of Rs 712 crores by conservative estimates. It further includes the sale of charcoal on no profit no loss basis to local people through the public distribution system.

"The proposal includes the participation of the local cooperatives of each village, who will be made profit sharing partners in the project, apart from a huge sum to be paid as royalty to the state government. Moreover, the state government does not have to expend a single sum for the project as the Gujarat State Forest Development Corporation will bear the expenses out of its independent funds.

"By conservative estimates one hectare of land produces five to six tonnes of Prosophis every year," the official said admitting it is difficult to estimate the total growth in the state. Moreover, the growth of Prosophis has stunted the growth of various other trees in the state and the forest cover has remained stagnant at 9.89 per cent.

References

1. Saxena, N. C. (2003), The Rural Non-Farm Economy in India: Some Policy Issues, Rural Non-Farm Economy and Livelihood Enhancement, DFID-World Bank Collaborative Research Project
2. **STOPPING FORCED LABOUR** – A Global Report under the Follow-up to the ILO Declaration on Fundamental Principles and Rights at Work.
   Source: www.ilo.org/declaration
3. Tewari Devi D; Campbell J Y, Developing and Sustaining Nontimber Forest Products: Some Policy Issues and Concerns with Special Reference to India, Working Paper No. : 00000001114
   Source: http://www.iimahd.ernet.in/publications
4. http://www.fao.org/documents
5. www.apcommercialtaxes.gov.in/ctportalnew/acts/caselaw
6. www.gujaratindia.com/Useful-Inf
7. http://labourandemployment.gov.in
8. http://gujaratforest.gov.in
9. http://envfor.nic.in/legis
10. www.goaforest.com/regulation
11. www.ahmedabad.com/news
12. http://www.rwedp.org