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Forest use survey and study of sustainable alternatives in the villages at the periphery of Corbett Tiger Reserve, Uttarakhand, India



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With The Society for Mahseer Conservancy



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Thanks

I want to thank my family for letting me go to India, despite all their fear regarding my accommodation, my health and my venues inside the forests of Corbett, where humans are preys for tigers.

I would like to thank from the heart Sumantha Ghosh for his warm welcome inside his association, for all his guidance along my internship, for the everyday sharing of his deep knowledge about forests, wildlife, culture and history and for his help whenever I needed it. I am indeed very proud to have worked with him, being a great naturalist and dreadfully engaged conservationist and I am very pleased to keep working with his association after the end of my internship.

I am also very thankful to Oliver Gray-Read for his support regarding the forest use survey, giving me good advice to realize it and to go further it. I much appreciated his biologist point of view as well as his British humour.

I would also like to thank Hemda Bahuguna for his help whenever needed and for his strong and catching talks during the meetings with the village ladies to make the Lantana furniture project possible.

My thanks also go to Dr. Ruchi Badola and Dr. S.A. Hussein from The Wildlife Institute of India, Deradhun, for respectively sharing her PHD study done on firewood consumption and for his help that he could gave me in any way in order to help my researches, as long as giving me the opportunity to access the great library and the facilities of The Wildlife Institute of India.

I also want to thank Keith Walters for his help regarding the wildlife presentations that I carried out in Tiger Camp resort, in Dhikuli.

A special thank goes to Paramveer Singh Hayer for his good help when my health was really bad, for his precious Indian histories and for made me discover the incredible festival of Bagwal.

Internship conditions

My internship took place in the villages situated in the periphery of Corbett Tiger Reserve (CTR) in Uttarakhand, India. Most of my researches had to do with the “Buffer Zone” of CTR, which is the area between the Corbett National Park and the habited areas, outside the park. Even if it is a rural place, there is a high density of hotels in the area devoted to the tourism of the park, especially in the village of Dhikuli. Other surrounding villages such as Sunderkhal, Ramnagar, Ringora and Choti Haldwani were also brought into play.

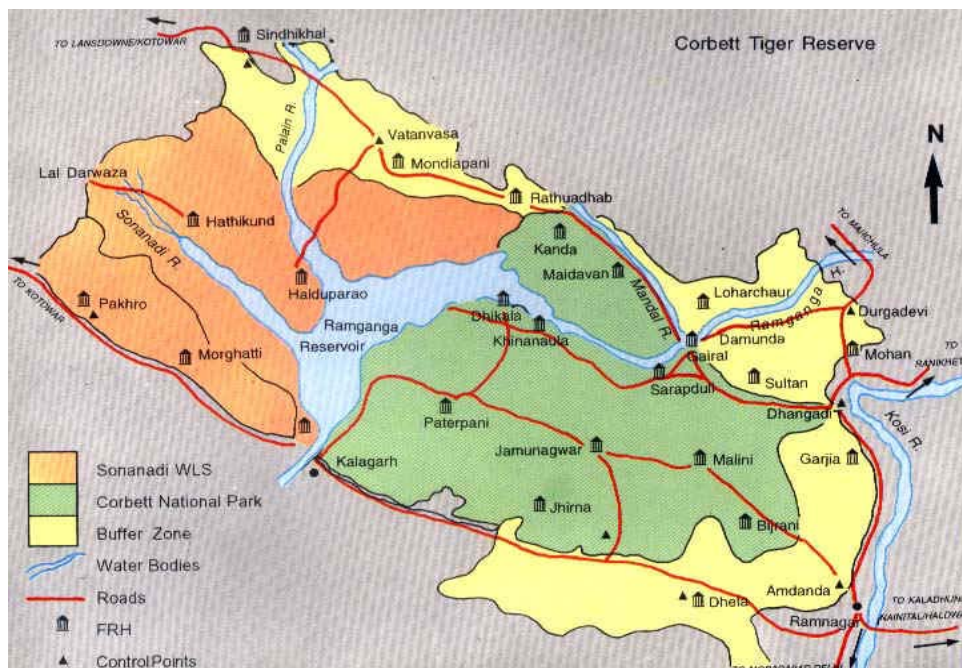


Figure a: Corbett Tiger Reserve map

I worked with The Society for Mahseer Conservancy under the supervision of its president, Mr. Sumantha Ghosh. The Society for Mahseer Conservancy is an Uttarakhand based conservation organization addressing grass root conservation issues specific to wildlife and community based interests of the region. In partnership with host communities, forest department, eco- lodges of the area and several national and international agencies, Society for Mahseer Conservancy stands as an example that conservation issues can be effectively addressed if there is a sincere will.

The Mahseer Conservancy initiative began around 2004 after local naturalists identified a need to protect and conserve the stretch of the Ramganga River leading upstream out of Corbett National Park. Bringing in the Corbett Tiger Reserve/Uttaranchal Forestry Department, the Eco-Development Committees of the villages along the river, and of course the villagers themselves, they formed a partnership to eliminate the persisting environmental degradation from destructive fishing methods that had been increasing in the area.

The project is now not just been acclaimed as a rare success in Indian conservation circles, but also received a surprisingly favourable amount of positive media and publicity coverage. It has expanded to tackle two other environmental issues. One is monitoring of and conserving the highly endangered vulture colonies, and the other looks at rural firewood collection and its social and ecological effects. Both of these projects are run from a new volunteer research centre and home-stay eco-lodge called ‘Vulture Centre’.

The Wildlife Institute of India, Dehradun, contributed to my work, providing me resource people and publications. I also worked with the ATREE association for the *Lantana* furniture making project, which has done really good work on this kind of project in South India. I also have got the help of Mr. Vinod Singhal, who is the Field Director of Corbett Tiger Reserve. He gave me support for my field work and for the *Lantana* furniture making project especially regarding the *Lantana* removing to avoid the plant to spread more. I have also got the help of Harishankar Dev and Mohan Chandra Joshi from the Youth for A Living Planet association which are respectively the President and a member. They were my assistants during my field survey.

During my stay in India, I lived three month among an Indian family, sharing their food, lifestyle and friendship. The other three months, I stayed in “Vulture Centre”, appreciating the life in an ecologic building with low energy consumption surrounded by wildlife, including tigers and wild elephants.



Figure b: Vulture Centre

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Introduction

Forests are massively important areas for so many reasons. Perhaps their most crucial role is in capturing and storing the ever increasing amount of CO₂ emitted by humans regulate existing climates in many ways, are essential for maintaining water-tables, preventing erosion and increasing fertility of soil. Likewise they harbour the areas of highest animal diversity, and provide habitats for some of the world's rarest and most iconic species.

In Indian Himalayan forests firewood collection may be the prime cause of forest degradation. In the rural parts of Indian Sub-continent and Asia, dead and green firewood is collected, usually by women and girls, from forests around villages and towns as the main source of energy for cooking and heating. In Uttarakhand and other parts of the Himalayan states this will account for 80% of households.

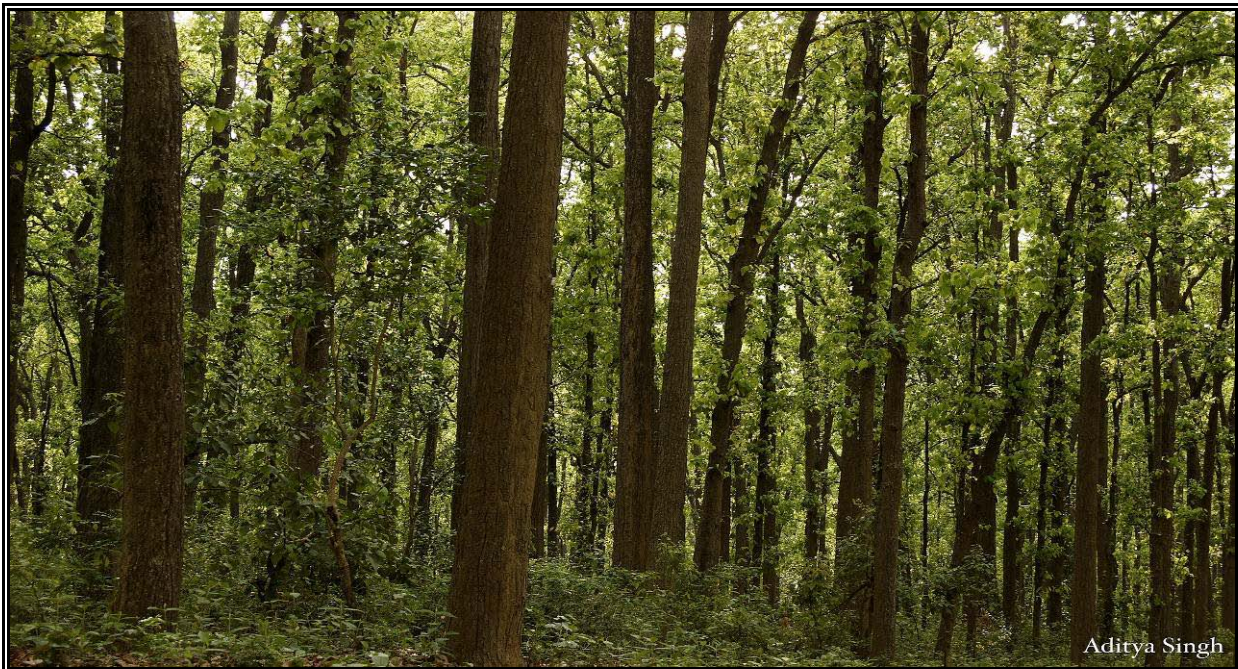


Figure c: Corbett Sal Forest

Collection techniques such as excessive lopping of green branches and harvesting of smaller living trees, weaken the canopy cover, reduce forest biomass, limit the growth potential of existing trees and weaken the regeneration capacity of the forest stock. As the assessment of forest cover is often taken from aerial satellite images this degradation can often go unnoticed. Hardwood species can take up to 80 years to reach full maturity and alpine coniferous species up to 130 years, so forests being intensively used for firewood collection in this way can pass the minimum threshold for recovery before they show any apparent effects. Forest degradation damage is often irreversible. As forests become more degraded and the population increases over time, the amount of time needed to collect firewood also increases, estimated at a 60% time increase in 25 years for Himalayan India.

Although firewood collection is a traditional activity, it also has a social cost. More time collecting firewood leads to lower levels of schooling and child health, or time pursuing other farm activities or employment. It is estimated that only 4% of rural Himalayan households use kerosene or gas for cooking/heating and a subsidy on LPG, covering 2/3 of its current price, should lower firewood collections by around 44%. Villages with higher poverty levels have been shown to be more dependent on firewood collection due to current unavailability of modern fuel substitutes.

Forests in Uttarakhand are therefore in great need of conservation and are also an important source of livelihood for the vast majority of rural residents so determining how they can be appropriately managed is extremely important.

Another reason for this study, which will not be investigated directly, is the man and animal conflict regarding this deforestation. This project was actually launched on a particularly sad event which took place inside the Buffer Zone of Corbett Tiger Reserve. On the 4th of February 2009, 52 year old Bhagwati Devi of Dhikuli village (in the vicinity of Corbett Tiger Reserve) went inside the forest as she had probably done for the last four decades. On that afternoon she was attacked and killed by either a Tiger or Tigress, as we still do not know for sure.

Since December 2008 this is the third such incident. In the previous two cases a woman from Tera (in Ramnagar Forest Division adjoining CTR) was mauled and so was a Van Gujjar a week later almost from the same area. Incidentally all three cases have happened in a radius of barely 10 Km. Such events, regarding man-animal conflicts, must be minimized as much as possible in order to save both tigers and peoples interests.

A. Forest use survey

Many forest use surveys have been done previously, studying the relationship between the villagers wood consumption and the amount of forest products been taken. One researcher who did a very good study on this topic is Dr. Ruchi Badola who went to the villages of Jaidevpur, Nayagaon, Amsaur and Jamargaddi and collected information on the amount of wood taken by villagers when going back from the forest. She also did an intensive inventory of flora species. However, she did not take her studies further to actually put together alternatives in order to reduce this wood collection. This project has the will to first look at and understand how the collecting happens inside the forest, since different methods are used by the villagers, different habitats are visited and different caste of people are studied. Secondly, this project proposes alternatives to the villagers in order to reduce their incoming inside the jungle with many positive consequences that it would imply.

1. Project

1.1. Framework

This projects ultimate goal is to further research and develop a prototype management strategy for reducing dependency on forests by people living around the periphery of Corbett Tiger Reserve, in order to reign back the damage being done to these valuable ecosystems, and as a by-product help to reduce man-animal conflict arising from people regularly entering tiger habitat.

1.2. Villages selected

For this survey, we will initially begin with three villages which are Sunderkhal, Dhikuli and Khatari since it is easier to make good work if a few places are selected instead of many more. We then would like to extend this study and the provision of the alternatives to the villages of Chorpani, Kania, Sawaldeg, Dhela, Laldhang, Kosi Barrage, Pampapuri, Amdanda Khatta, Ringora, Chukum, Mohan and Kunkhet, making fifteen villages studied in total.

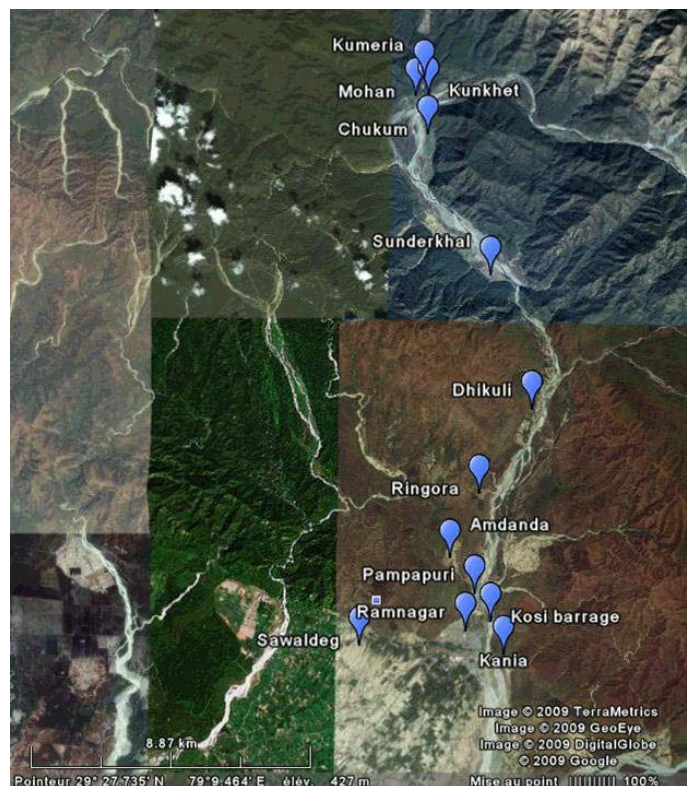


Figure 1.1: Villages involved in the study

Sunderkhal is a poor village which has no legal status. That means that there is no electricity or running water. It also means that if the government tells the villagers to leave, they have no right to stay. Villagers from Sunderkhal are highly dependant on forest products such as wood, for cooking and grass for feeding their cattle. They often cross the Kosi river to get it, even during monsoon when the water level is quite high and the flowing current quite heavy.

The village of Dhikuli has a better status since the great number of hotels brings a good economy to the village. There is electricity but they sometimes lack water and have to go to the source or pump it from down reservoirs. Dhikuli villagers are dependant on the same forest products as in Sunderkhal.

Khatari which is situated in Ramnagar is quite a poor area as well. However, villagers use the wood for a different goal which is to have it sold to Ramnagar's market. Even before the beginning of the survey, that fact was clear to me since every day, I could see many people carrying huge bundles of wood on their heads towards Ramnagar. People in Khatari do not possess cattle and therefore do not collect grass inside the jungle. However, they can be seen carrying barks, once again to have it sold in the market.

1.3. Aims

There are three aims for this project which are as follow:

- A. To further existing knowledge as to how bio-geographical, cultural, commercial factors, social, economic affect the time spent, the distance covered and the amount taken during firewood collection in the survey area.
- B. To assess the elasticity of forest collected firewood when subsidized, sustainable alternatives are provided, and to try to reveal and highlight other factors causing resistance to switch from forest collected fuel.
- C. To work closely with rural communities in R&D of practical, user-friendly and viable modern, sustainable fuel substitutes.

1.4. Objectives and survey location

These aims are to be achieved by two objectives:

OBJECTIVE 1: assemble and extensive profile of selected sample villages

OBJECTIVE 2: in-depth research of firewood collection response to provision of sustainable alternatives

The survey will be conducted in villages on the eastern and southern peripheral areas of Corbett Tiger Reserve (CTR) and cover between Kunkhet and Laldhang.

Survey sites were selected after consultation with local NGO officials, forest department staff, and naturalists in the area. The criterion for potential survey sites were that they should be typical of rural settlements in the area, ie heavily dependent on firewood for cooking and heating purposes, and very limited as to access to basic amenities such as electricity, water and with little to no employment available. Fifteen suitable sites were identified, as the villages where firewood collection was believed to be most severe. Information on these fifteen villages is available. Of these fifteen, three were then selected for further in-depth study. The three were chosen to represent the widest cross-section of the villages in terms of a variety of factors, such as economic and legal status. Households surveyed were selected on a random basis by the method outlined in the preliminary survey section. The final selection of households equates to three households to be surveyed in each village, per calendar month.

2. Methodology of objective 1: assemble and extensive profile of selected sample villages

A number of parameters from both secondary and primary data sources will be used to fulfil this study objective.

2.1 Secondary Data Collected

Secondary data will be provided by official sources at the Block Office of Ramnagar. The parameters collected for each of the three sampled villages will be:

- Number of households
- Number of persons
- Number of people per households
- Cattle per Village
- Cattle per household
- Average household economic status
- Number of employed people
- Legal status of village (registered or encroachment)
- Panchayat status of the village
- Size of village (including farmland) in square kilometres
- Number of children (male)
- Number of children (female)
- Number of adults (male)
- Number of adults (female)
- Number of senior citizens (female)
- Number of senior citizens (male)
- Number of people classed as BPL
- Literacy rate (boys, girls, adults, senior citizens)
- Education facilities
- School attendance rate
- Primary healthcare facilities
- Subsidies provided (food)
- Subsidies provided (water)
- Subsidies provided (electricity)
- Solar power provided
- LPG provided
- Employment scheme
- Percentage of OBC / minorities
- Percentage of different religious groups

2.2. Primary Data Collected

Primary data for this objective will be conducted in two ways;

1. A questionnaire survey for a senior village official for each of the three villages which are Dhikuli, Sunderkhal and Khatari in Ramnagar
2. An informal questionnaire for members of selected households

The exact details of these survey methods are detailed below.

2.2.1. Village Official Questionnaire

This questionnaire will be completed once by a member of the village EDC, panchayat or council for each of the three villages. The data collected will be as follows;

1. How many households in the village have mains electricity supply?
(-25%, 25-50%, 50-75%, +75%)
2. How many households in the village have generator electricity supply?
(-25%, 25-50%, 50-75%, +75%)
3. How many households in the village have renewable (solar etc.) electricity supply?
(-25%, 25-50%, 50-75%, +75%)
4. How many households in the village use gas/lpg for cooking or heating?
(-25%, 25-50%, 50-75%, +75%)
5. How many households in the village use firewood for cooking or heating?
(-25%, 25-50%, 50-75%, +75%)
6. How many people per household on average have regular paid employment?
(Average)
7. How many households have close family members who have migrated to find employment?
(Approx)

2.2.2. Informal Villagers Questionnaire

This questionnaire will be completed by a senior member of a surveyed household for each of the three villages, potentially three households per village depending on circumstances. This questionnaire does not have to be asked entirely in one time, not to arise any suspicion or annoying from the villagers. The information collected will first be noted in a small notepad, and then be summered in a table and any missing information can be asked at any moment.

1. How many people in household?
2. Ratio of male to female?
3. Ratio of adults (+15 years) to children (-15 years)
4. Number of people in household who regularly (+ once per week) collect forest products?
5. Does firewood collection take longer now than 10 years ago? (Y/N)
6. Attitude towards firewood collection? (Like / Don't mind / Dislike)
7. Have they ever received any subsidized alternative cooking or heating fuels methods?
(Y/N)
8. If yes, were they utilized? (Y/N)
9. If no, what was the reason for discontinuation of use?
10. What would be the alternatives to firewood collection that they would be more kind to use?
11. If their dependence of forest products was reduced would firewood collection reduce alongside?
12. Can they quantify the amount of firewood used in a day?
13. If so, would they be able to notice the difference before and after the provision of alternatives?
14. How do they heat the house during winters (if needed)?
15. How do they light the house at night?

For both questionnaires the following information will also be recorded; Village Name / Location, Interviewee (s) Name (s), Interviewee (s) Position (s), Interviewers Names and Date. Those data will be put in a summary table (APPENDIX A).

3. Methodology of objective 2: in-depth research of firewood collection response to provision of sustainable alternatives

This step essentially is conducted in two parts;

1. FIREWOOD COLLECTION PATTERN FIELD SURVEY

2. PROVISION, MONITORING AND R&D OF SUSTAINABLE FUEL SUBSTITUTES

3.1. Preliminary Survey

Preliminary surveys were carried out to gain an accurate idea of the logistic feasibility and acceptability to local people, and to identify survey strengths and weaknesses and fine-tune survey methodology.

During the preliminary survey the three villages were visited by a two field researchers, one a local man, the other being myself, and villagers were approached and asked if they would be prepared to be accompanied by the researchers and on agreement the preliminary surveys were then carried out.

Some valuable lessons were learned at this stage, it was found that this informal method of approaching villagers contributed to establishing essential trust and rapport between villagers and researchers, also establishing a network of local households to accompany as part of the field survey.

3.2. Firewood collection pattern field survey

The initial part of this step is to use field surveys to analyze firewood collection patterns. Field Research teams of two persons meet with outgoing women early in the morning, either by prior arrangement or an ad-hoc basis in early morning. They rendezvous with the household collection party from the village and then accompany them on their morning rounds and return with them to the village. A preliminary survey has first been carried out.

3.2.1 Timescale and Survey Schedule

Each of the three selected villages (Dhikuli, Sunderkhal and Khatari in Ramnagar) will be surveyed for three days every calendar month, and this is to be repeated every month for a full year.

In the event that one village cannot be sampled during one then the other villages will also be missed to avoid any bias in results.

This full year sampling timescale will importantly provide a complete picture of changing seasonal patterns in forest-biomass extraction.

3.2.2. Field data collected

Whilst on the rounds I recorded on a small notebook the following data;

a. Village name

The name of each village in which sampling takes place

b. Collection group number

The number of villagers in the party, not including researchers, that are present during firewood collection, included whether they are involved in the physical gathering of forest products or not.

- c. Male/female ratio
The number of males and the number of females in each collection party.
- d. Adult/child ratio
The number of adults (+15 years) to children (-15 years) in each collection party.
- e. Approximate age range
This will be asked of as many members of the collection party as possible with at least the youngest and oldest ages recorded.
- f. Starting time of party
The time at which the collection party leave the limits of the village to collect forest products.
- g. Total walking time
This will be the total walking time recorded, not including time spent when the majority of the collection party are collecting forest products.
- h. Collecting time (s)
The total time recorded whilst the collection party stop to gather forest products at a collection point.
- i. Total bundles collected
The total number of bundles collected by one collection party on one collection route.
- j. Material contained
The type of material will be collected (Firewood, Grass, Bark, Animal Fodder, etc) will be recorded.
- k. Estimated bundle weights
Each bundles weight will be estimated as in one of three categories; 0-10kg, 10-20kg or 20kg+.
- l. Estimated percentage of green wood in one bundle
This was made at my discretion to make an informed guess as to the estimated percentage of green biomass contained in one bundle per collection party.
- m. Habitats visited on collection route
This will be essentially a rapid phase 1 habitat assessment of all distinct habitats visited whilst on a collection route (Sal tree forest, mixed forest, etc).
- n. Whether second collection route is undertaken on the same day as described.
- o. Any other endpoint for forest products collection besides domestic use
Again this parameter was done partially at my discretion as broaching the subject may be seen as suspicious, however any information I observed (ie collection parties taking wood directly to a non-domestic source), was noted.

The following parameters will be related to the geographical range of collection parties routes and will be recorded as Lat/Long co-ordinates by a handheld GPS using WGS 84 datum (APPENDIX B);

- p. Starting location of party
The location, (the latitude and longitude) at which the collection party leave the limits of the village to collect forest products.
- q. Collection point location (s)
The location or locations, at which the majority of the collection party stop at a collection point to collect forest products.

Using these waypoints the following data can be retrospectively measured;

- r. Furthest straight-line
Distance from starting point to any collection point as described, measured in kilometres.
- s. Total distance walked on collection route
The total distance in kilometres from the initial starting point to the endpoint for the collected forest-products.

When I came back from the survey, I put the data collected in a summarizing table (C).

3.3. Provision, monitoring and research and development of sustainable fuel substitutes

The final step of this survey is to provide alternative and sustainable fuel substitutes to the sampled villages. This will be done to three houses in each village to get data about the use of alternative, and in a further goal, to provide alternative to the entire village.

The alternatives will be provided one or two month, depending on time, after the firewood survey begins. That way the difference will be seen between the time when no alternative is provided and the time when it is.

3.3.1. Primary Data Collected

Before beginning the survey, I went to the three villages and find in each the three houses that were selected for the alternative provision survey. The houses which were visited first were the ones where relationships were established during the preliminary survey. They were told the purpose of our study and asked if they would like to be part of it, telling them how it would be conducted. In any case, two or three other houses would have to have been selected. I had to bear in mind that the houses would be selected randomly, without any further study of the household, in order not to create suspicion or embarrassment from the householder.

The three houses selected, during one or two month(s), would be asked to note information about their current way of cooking, without using an alternative, so that we can see the difference between before and after the provision of the alternative.

During the first/ two month(s) and therefore prior to the provision of any alternative, the information about cooking sheet (APPENDIX D) would be given to the householders. They will be asked to fill it as often as possible, to find out the best alternative that could be given to them, free of charge, depending on the needs of the villagers but also depending on their will.

3.3.2. Timescale

The procedure will be done the same day of the firewood collection field survey, in every houses selected. Each of the three selected villages (Dhikuli, Sunderkhal, Khatari) will be surveyed for three days every calendar month, and this is to be repeated every month for a full year. In the event that one village cannot be sampled during one then the other villages will also be missed to avoid any bias in results. It is expected that due to the availability of field researchers only a couple of months during the year will have to be dropped.

3.3.3 Provision of sustainable fuel substitutes: the different possibilities

Depending on every need of each household, the following alternatives could be provided.

For cooking

a. The smokeless chula

It requires less wood than open chula to cook the same dish and the heat produced remains inside the chula instead of dissipating in the air. The smokeless chula also ensures that cooking is no longer a health hazard, since the smoke produced is taken out from the house (if used inside the house) by a fixed pipe. The chula could be given or built inside or outside the house.



Figure 3.1.: Smokeless chula

b. The pressure cooker

In addition of the smokeless chula, a pressure cooker can be used to reduce once again the time of the cooking. It would have to be given to the villagers.



Figure 3.2.: Pressure cooker

c. The solar oven

This resource can easily be used in north India since the sun intensity is quite high, almost all day long. The solar oven is very useful in the sense that it requires only sunlight to work and that it can cook the dishes without any external help from the villager. It allows long time cooking but avoids frying. Since it is really easy to make one, at the dimension that the villager wants, the

materials will have to be provided, but the building of them could be done during an afternoon activity, with the help of the volunteer. I am well aware that this alternative would be hard to introduce to Indian households, since they have been using for decades, and even centuries wood for their cooking. I believe that if someone can show them how to prepare Indian food and how much time and effort can be saved, its use can definitely work.



Figure 3.3.: Solar oven

d. The LPG (Liquefied petroleum gas)

This would be the best alternative for cooking because it doesn't require any wood at all. This alternative comports a gas bottle, a simple or double burner gas cooker and a plastic pipe to connect them to each other. If LPG gas is provided to the villagers, there will have to be a long term provision of this resource, either by finding funds or by getting the gas bottle at a really low price (or even both if possible).



Figure 3.4.: Double burner



Figure 3.5: LPG bottle

For getting electricity

a. The solar panel

It is used to convert the energy coming directly from the sun into electricity, by a photovoltaic process. A battery system is also needed, depending on the needs of the villager, to store electricity when not used (during the day time), and display it during the night time, when there is no more sun light. A converter may also need to be used, since the solar panel displays electricity at a certain voltage and amp level, it has to have the same characteristics of the device used (lamp, mobile charger, etc). Once again, the size and the power of the solar panel have to be

accorded to the need of the villager. But in most cases, the converter will not be used since it would require a great capacity and therefore a big amount of money for the solar panels to charge the battery.



Figure 3.6.: Solar panel

For getting light

a. The solar panel

See above.

b. Candles and fuel lamps

They could be provided in addition or in replacement of solar panels, as they provide an instant light and are not really expensive. Precautions need to be done regarding any problem of starting up a house fire.

3.3.4. Field Data Collection and Monitoring of the Alternatives

An alternative to firewood consumption will be provided to each of the three selected houses in the three villages, making nine studied houses in total, depending on their needs.

Depending on the different alternatives provided, the volunteers will have to explain to the villager the following instructions on the alternative;

1. How the alternative was built (for smokeless chula for example)
2. How does the alternative work/ how to use it
3. How to maintain the alternative (how to clean it, how to fix it)
4. Things not to do with the alternative (not to use the smokeless chula for all day long for example)

Information will also be asked from the villagers to be noticed in a sheet having the same format as the information about cooking sheet (APPENDIX D), as often as possible (the best would be after every use).

When I will go for the firewood survey, that is three days a month, I will also collect the information written down by the villagers and ask for the general feeling of using the alternatives, any problem met, any improvement that could be done.

I will also, as often as possible, visit the other houses where the alternative has been provided, to see how it is going on, and notice any information on the information about cooking sheet.

If any problem occurs, I would be able to solve that problem in order to make it work properly since I have a “technical” background.

3.3.5 Day time basis procedure for the survey

1. On the morning, with a prior arrangement, I will go with a group of ladies and do the field data collection regarding firewood.
2. When coming back, I will have to do the alternatives monitoring of the studied house.

3.3.6. Month time basis procedure for the survey

The survey should be conducted as follow;

1. On the first week, three houses will be studied as long as three groups of women, one in each village. Basically, I would visit the first house and a group of women in Sunderkhal on Monday, the first house and a group of women in Dhikuli on Wednesday and the first house and a group of women in Khatari on Friday.
2. On the second week, three other houses will be studied as long as the three same groups of women, one in each village. I would visit the second house in Sunderkhal and the same group of women on Monday, the second house and the same group of women in Dhikuli on Wednesday and the second house and the same group of women in Khatari on Friday.
3. On the third week, the three left houses will be studied. I would visit the third house house and the same group of women in Sunderkhal on Monday, the third house house and the same group of women in Dhikuli on Wednesday and the third house and the same group of women in Khatari on Friday.

The same group of women is kept all along since it is easier to meet them on the next date (making arrangements) but also because a link is created if the same persons are seen regularly. That way, during the first day of study, an arrangement will be made with the group of ladies for the following week, giving a time for departure for the firewood collection.

The in-between every day data collection time should be used to put together all the data collected, in two tables. One regarding the firewood collection data (APPENDIX C), the other one regarding the monitoring of the alternative (APPENDIX D).

4. Data Analysis

The information collected Sunderkhal (APPENDIX E), Dhikuli (APPENDIX F) and Khatari (APPENDIX G) will be used to point out the link between the firewood consumption and the social and economic status of each household. So far, it was hard to follow the method established since I had several health problems which did not allow me to go in the field for weeks. However, I collected enough data to put forward a pattern regarding the wood collection, the man-animal conflicts and the social aspects. A complete and detailed study would indeed need to be done over a year, to see the differences involved with the changes of weather but also to have much more data and therefore to decrease the error on it.

4.1. Questionnaires

Regarding the secondary data collected, I had some trouble to find out all the information since it was not available in the block office of Ramnagar, related to improper maintenance of records. Data on Sunderkhal could not be found. I therefore have got few information for Khatari and Dhikuli, as follow:

	Dhikuli	Khatari
Number of households	450	6594
Number of persons	2000	
Number of people per household	4/5	
Cattle per village		
Average household economic status	Average	Normal
Cattle per household	1≤	
Number of employed people	1000≤	
Legal status of village	90% Registered, 10% encroachment	
Panchayat status of the village	Panchayat Dhikuli	Nager Palicka Ramnagar
Size of village km ²	4/5	
Number of children male	350	1717
Number of children female	300	1491
Number of adults male	500	6648
Number of adults female	600	5484
Number of senior citizen female	75	
Number of senior citizen male	145	
Number of people classed as PBL	75	
Literacy rate	75	
Education facilities	Good	
School attendance rate	90%	
Primary health care facilities	Poor	
Subsidies provided (fuel)	As per government rules	
Subsidies provided (water)		
Subsidies provided (electricity)		
Solar power provided		
LPG provided	90%	
Employment scheme	Hotel industry, NREGA, agriculture	
% of OBC/minorities	20% OBC	Maximum
% of different religious groups	25%SC, 55% general	Maximum

Table 4.1: Secondary data collected

Regarding the village official questionnaire, it can not be shown here because at the stage of the writing of this report, the step of starting the selection of the three households in each village had not started yet. This will be realised for the provision of the alternatives and especially the solar cookers (see section 5.1.).

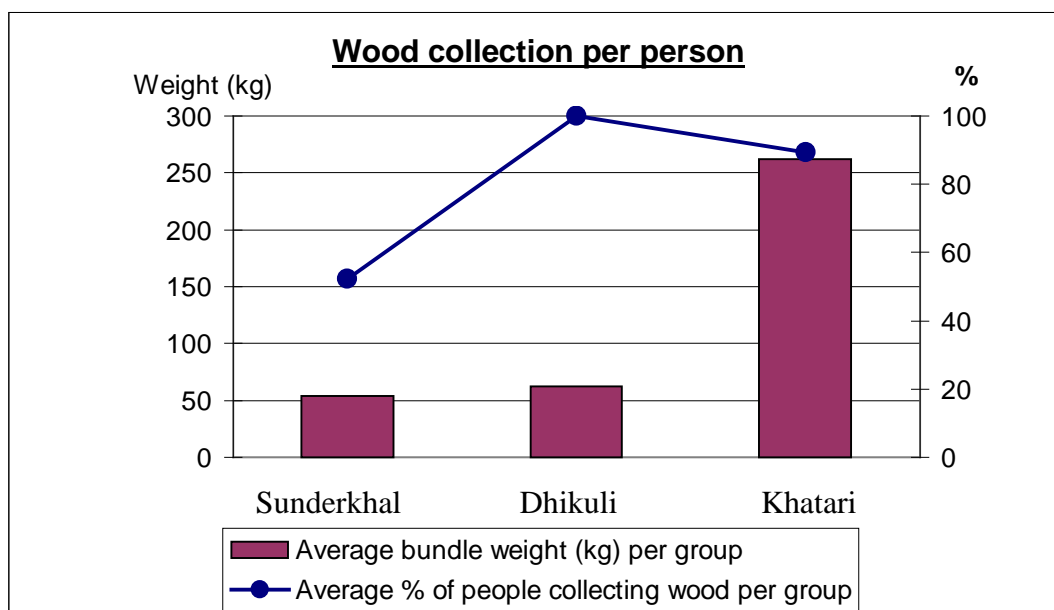
4.2. Feelings with the villagers

During my field surveys, I met two types of feeling with the villagers. The first one that I felt in Sunderkhal and Dhikuli was a very friendly one. The first hours, the ladies were a bit shy and curious about me but after that time past, they were quite happy for me to be with them and answered my questions about their work in the forest, the wildlife, their family lives without hesitation. Whereas in Khatari, every venue was seen as an intrusion to their wood collection. I was looked down upon, asked many times why I was there and I could feel a big feeling of suspicion among the groups. Once, they even thought that my assistant and I were from the FBI and that I

was would straight away give a report to the Forest Department of their activities. It was indeed much more easy and pleasant to work with Sunderkhal and Dhikuli villagers. However, it has to be kept in mind that the collection of wood inside the Buffer Zone is no illegal if one bundle of a “reasonable” size is collected. That is why it was so hard to work with Khatari villagers since their bundle are everything but of reasonable sizes.

4.3. Wood collected

One of the main preoccupations of this study was to find out how much wood is taken out from the forest by the villagers. Since the bundles could not be weight because it would have awoken the suspicion of the villagers, it was always estimated or told by the villagers. Considering that, this data is reasonably accurate so still we can see a big difference between the three villages.

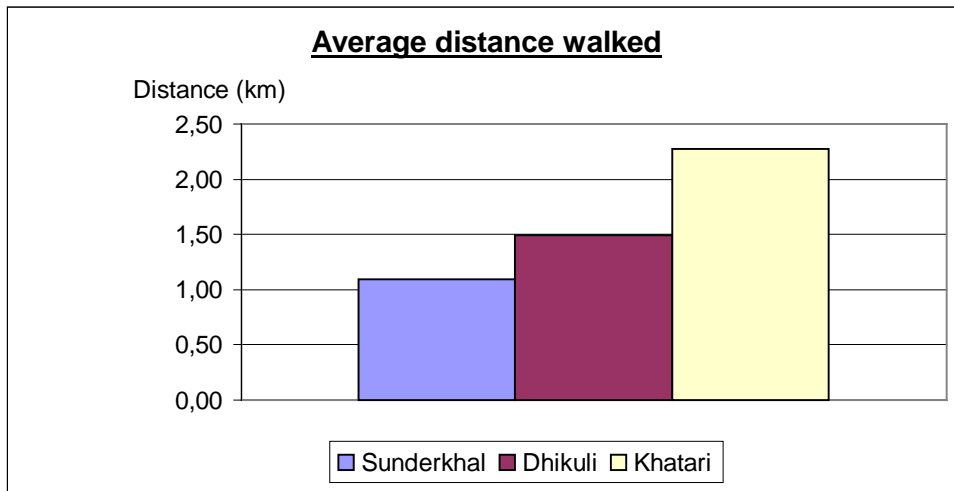


Graph 4.1: Wood collection per person

This graph shows two things. The first one is that Khatari villagers collect about five times more wood than Sunderkhal or Dhikuli villagers with an average of 263kg wood taken per group. Moreover we can see that there is a high percentage of people in a group both in Khatari and Dhikuli who collect wood, whereas in Sunderkhal there is about 50% villagers who do not, mostly because they collect grass instead of wood.

4.4. Man-animal conflict

The man-animal conflicts are strongly linked to the degradation of the habitat of the tiger which is clearly due to the collecting of wood that stops the growing of many trees. But it is also due to the fact that villagers are stepping in the tiger’s territory and because of its territory instinct, the more time spent in the forests and the greater distances covered by villagers are increasing the chances to be confronted to the big cat. Therefore, the average distance walked to the collection point and the average time spent collecting are studied.



Graph 4.2 : Average distance walked to the collection point

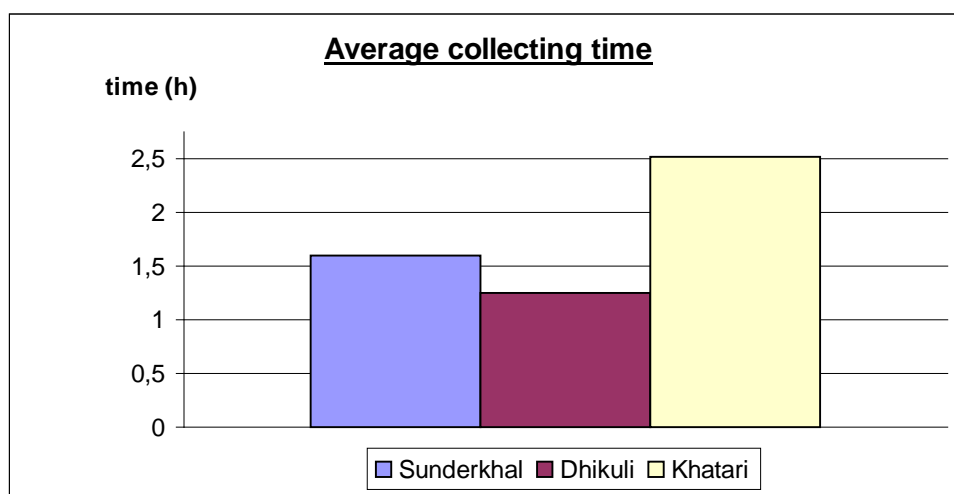
It can be seen that Khatari villagers cover the greater distance. That can be easily related to the fact that they are in search of a large amount of wood and so, they are ready to walk longer distance to be assured to get enough wood. Since they are going to collect it in order to sell it in Ramnagar’s market, the more wood they collect, the more money they will get.



Figure 4.1. : Satellite image of the collecting and attacks areas

The circles represent the greater area that villagers from each village can cover. It is matched with the location of the four attacks on villagers by tigers. The pink circle corresponds to Khatari, the green one to Dhikuli and the blue one to Sunderkhal.

No attack on villager were recently recorded in Sunderkhal village. However, once when I was with ladies for their wood collection, I could hear cheetal (or spotted deer) alarms call, which are emitted by the deers to warn of the presence of a predator. Few minutes later, I heard a tiger roar about few hundred metres away. Sunderkhal is actually known to have a big population of tiger. Therefore, ladies have still a chance to meet tigers in there. The deadly attack on a lady that happened in February took place in Dhikuli. Often when going with the ladies, we could see pugmarks on the ground, proof that there were tigers in the area. Khatari has encountered many attacks and covering a greater area, they are indeed more likely to face that problem. That great number of attacks can also be related to the number of people living in Khatari compared to the number of people living in Dhikuli. There is about 14 times more people in Khatari than in Dhikuli. So much more people covering a great area are indeed inclined to encounter the biggest number of attacks from wild animal, especially tigers.



Graph 4.3.: Average collecting time

The collecting time is quite crucial regarding the man-animal conflicts since at that point, the group of women separates and go in search of wood sometimes dozens of meters away from each other. And that time is the most suitable for the tiger to attack whereas when in group (at least five people), there is about a hundred percent of safety. We can see that Khatari villagers spend more time inside the jungle than the other two. Spending about two hours and a half occupied to collect wood is quite a large time, especially when tigers and elephants can attack or charge you.

4.5. Social aspects

The social aspects can be related in most of the cases to the economic status of the houses. These aspects can be divided in two parts, one about the age of the collector and one about the sex of the collector. During the field survey, I collected the average age of the collector group. However, it is not representative of the extremes since almost every time I have gone with villagers, really young girls or sometimes boys were going, as well as old ladies. This is related to the economic status of the house since children, if there is enough money in the family, are supposed to go to school, and the old ladies are supposed to stay at home since they are quite tired.

The other aspect I was able to see is that the only place where I have seen men collecting wood was in Khatari. It can easily be understood, since they collect it for the money they will get by selling it,

it might be considered as any other job. Once again, it was hard to ask the reason of the presence of men in the jungle since the dialogue with the villagers of Khatari was a bit complicated.

4.6. Weather changes and frequency of collecting

During the field survey, I did not take notes of the daily weather. However, with an overall view of the survey, I can say for sure that during monsoon, the villagers of Dhikuli and Sunderkhal go much less frequently in the jungle, being every two other day in Dhikuli and every two or three days in Sunderkhal. The villagers of Khatari keep going inside the forest, exception made if there is a really heavy rain in early morning. I actually saw the changes of pattern between June, during the summer period which was very hot, and July and August, during monsoon period, which was very hot and very humid. The heat only left when it was raining. Many Indian people said that monsoon was deranged since raining period were not as frequent as expected.

5. Provision of alternatives

At the beginning of the study, I focused on the firewood use survey because we needed to have a wood consumption pattern in order to give the right alternatives to each village. After a certain time of field survey, it became clear that villagers of Khatari would not stop or reduce their incoming in the forests if we provided them solar cookers. We had to find a solution that would bring them money. Following the same idea, villagers of Dhikuli or Sunderkhal would be more likely to be given solar cookers, since their wood collect is almost entirely used for cooking.

5.1. Solar cooker

At the beginning of this study, I had a strong will to build a least one solar cooker and to have it introduced to an Indian family. However, after some time, I changed my mind since we were proposed to be given two hundred solar cookers, free of cost, from an association. It was indeed much appreciated, but we did not take that step further since another project on Lantana furniture making came to our hands and needed all our attention. The provision of solar cookers will of course be started when this other project will be launched. When it will be so, I will follow the method established for this forest use survey and give the information about cooking sheet to the villagers concerned (APPENDIX D).

5.2. Lantana furniture making

This project was started after we contacted an association ATREE (Ashoka Trust for Research in Ecology and the Environment) who is handling training for villagers in order to make furniture out of the *Lantana Camara* weed. This plant was brought in a century ago by the British as an ornamental plant. However, it is nowadays considered as an invasive species since it spreads quickly, is very hard to control and creates sickness and skin diseases on animals when eaten. It is also a serious obstacle to the natural regeneration of native trees and plants. It also makes a perfect habitat for mosquitos, encouraging the spreading of the Malaria disease.

ATREE had done a really good job in Chittoor (Andhra Pradesh), Natham (Tamil Nadu) and Male Mahadeswara hills (Karnataka) regarding *Lantana Camara* baskets making and we thought this project could really work in the area. This would serve three causes which are to remove an invasive species, to improve villagers' lives by increasing their revenues and to reduce the man-animal conflict. This last one will obviously be reduced since villagers making furniture will visit less often the forest. For this project, we initially selected three villages which are Sunderkhal, Ringora and Choti Halwdani. The goal from our side is to find enough villagers to participate to

the training, to follow and to record on video camera the training session and to search for a market and a demand to be assured that the furniture will have no problem to be sold.

So far, we have made one meeting with the villagers in each village and they are taking the project quite positively, which is very good. The beginning is indeed a bit hard since we are starting from nothing but I am sure it is undeniably worth working intensively on it.

A further goal of this project is to afforest the areas where *Lantana Camara* will be removed, by putting native tree, grass and plant species.

B. Other work

In addition to the forest use survey I did other work for The Society for Mahseer Conservancy as long as for the resort “Tiger Camp”, in Dhikuli.

1. Eco renovation of Vulture Centre

Vulture Center is so named because of the two colonies of the most endangered species the White-rumped Vulture situated in a large Haldu tree within 100m of the centre, an indication of a possible resurgence of vultures in the area. The monitoring research focuses on how cause of the decline (poisoning through veterinary drugs used on cattle), is still affecting vultures and observing any recoveries, and taking actual conservation actions in the terms of visiting villages near colonies and surveying animal husbandry workers.

When I started my internship, Vulture Centre was not built yet and it was an old building used for cattle and wood storage. The idea was to renovate the walls, the roof, the doors and the windows and to make the building energetically self-sufficient. It was indeed renovated using local knowledge of construction which is very ecologic.



Figure 1.1.: Vulture Centre before renovation outside



Figure 1.2.: Vulture Centre before renovation inside

1.2. The roof

After taking out all the storage and removing the cattle attachment, we started the renovation with the roof, to prevent the rain to destroying any renovation done inside the building. The existing roof was totally removed and a new structure was built with termite repellent treated wood, attached with strings. Bamboo was then used to create a “grid” to put the roof on. After that, dried grass was put on this grid with a layer of about 30cm.



Figure 1.3.: Wood structure



Figure 1.4.: Bamboo grid



Figure 1.5.: Grass layer



Figure 1.6.: Finished roof

1.3. The walls and the floor

The initial walls were constructed with brick and cement. There were a lot of cracks so the walls needed several layers of mud to become cleaner and less suitable for insects. The mud used was

actually a mix of mud and cow dropping. Using hands, I helped the ladies to put this “mixture” on every wall which is locally called “lipai”. The final stage of each layer was to put water on walls in order to make the surface as regular and smooth as possible. We did four layers in total, two for the inside walls and two for the outside walls. We did the same for the floor, two layers of mixture were put.



Figure 1.7.: Lipai with the villagers outside



Figure 1.8.: Lipai with the villagers inside

1.4. The apertures

Before the renovation, there were really few and small apertures in the walls. Therefore, in order to bring the greater amount of light inside the building, two big windows were created. It was done by destroying the wall at two places and then putting a window made of wood with anti-mosquito grid.



Figure 1.9.: Destruction of the wall



Figure 1.10.: Putting in of the window

1.5. The toilets

Since there is no sewage, it was decided to use dried toilets. It is also a good ecologic manner to dispose of human excrements. A hole of about 1,20m deep and 50cm of diameter was dug in the ground and a tender box was put on top of the hole. A toilet tent was then added. After going to the toilet, we would put a fistful of mud or shaving of wood.



Figure 1.11.: Toilet tent

1.6. The painting

The final step of the renovation was the painting. The inside walls were paint in white to make the interior brighter whereas the outside walls were left with their “mud” colour, to merge with the surrounding. A red line was paint at the bottom of the inside walls, as it is often done in rural houses. The doors were paint in a sky blue to bring colour to the house.

2. Electricity supply for Vulture Centre

Ringora village, where the Vulture Centre is situated has no legal status, which means that the villagers have no electricity or running water. In addition to that, if the government ask them to leave, they have no right to stay. Therefore, we had to rely on alternatives in order to get electricity inside the house. There was a strong will from The Society for Mahseer Conservancy not to use a fuel generator since it is very anti-ecologic. It would have polluted the air with CO2 emissions, created a lot of noise when in use but also bring an aesthetic sight for the centre. Therefore, even if the weather was quite hard to bear for about a month, due to heavy heat, the solution to use a generator was never chosen.

2.1. Energy demand

Since this building will be used for the volunteers of The Society for Mahseer Conservancy to stay, it was first thought that the energy demand would consist of:

- lighting at night, when the sun rises
- running of fans at night time on the sleeping area
- running of a fan at day time for the eating area
- charging of laptops
- charging of mobile phones
- charging of any other device (boiler for water, cameras, etc)

However, after having seen the material available, we had to cut down the demands to only supply electricity for light at night and fans during both day and night time. Any kind of charging would be realised in the office of The Society for Mahseer Conservancy.

2.2. Material available

Since Ramnagar, which is the nearest market, was almost uninformed on solar applications like solar fan and had very few resources regarding solar panels and battery, we had to take what was available and also do with the knowledge of local electrician. The initial fans (one for the dinning area and one for the sleeping area) were too powerful (100w) and the solar panels were not powerful enough to charge the battery in order to run the fan all night long. That is why the local electrician made an order in Bombay to buy solar fans, one for the dining area and one fan per bed for the night time (with three beds). We also decided to use low consumption lights to decrease the energy demand. The material finally chosen is as follow:



Figure 2.1.: Solar panels of 37W each



Figure 2.2.: Battery

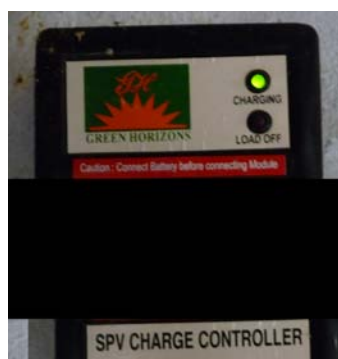


Figure 2.3.: Charge controller



Figure 2.4.: Solar fan



Figure 2.5.: LED tube light

Since the material was recommended online with a brand almost unknown, no technical specifications were available. Some information regarding the solar fan and the LED tube light can be found in APPENDIX H. The charge controller would tell when the solar panel are charging the battery or when the battery level was low, using green or red LED.

2.3. Installation

The centre and the electric installation were realised in a very small time frame and no previous study on shadow pattern. The solar panels were then placed on the ground away from trees and with an inclination available which was on the etch of the house. The best inclination would have been 10° , since the building is situated at latitude of 29° (1). The four solar panels were connected in series and then connected to the charge controller, in order to have a steady input for the battery. After the battery, a connector was put to rely all the fans and lights wire to the switches. With an arrangement of four solar panels of 37W each, the total installation was of 148W. The solar fan and the lights both run onto 12V DC (direct current) since it is the output voltage of the battery. The solar fan consumes 12W at the maximum speed (with three speeds in total) and the light consumes 2,5W. No technical following of the installation was made since there was no resource for checking the current per hour delivered by the solar panels. I could

only see that the fans were working whenever we needed it. There was a lack of fans for a few days during the monsoon when there was very weak sunlight.



Figure 2.6.: Solar panels on the edge



Figure 2.7.: Connector

3. Wildlife executive

The supervisor of my internship, M. Sumantha Ghosh, is also a border director of Habitat Hotels, a hotel chain. His office is based in the resort The Tiger Camp, in Dhikuli. He proposed me to be a wildlife executive for the guests of the resort which I accepted with pleasure. It was pleasant for me, since I had been several time inside the park and I grew a certain knowledge about the flora and fauna of the park which I could display to the guests. I also did a power point presentation regarding awareness of local flora and fauna every other two nights. I also sometimes went with guests for safaris or morning walks, crossing the river and showing them different kinds of birds, mammals and answering as much as possible every question they could have.

Conclusion and discussion

During this internship, I was able to realise a lot of field work which was crucial in order to understand many points behind this wood collection.

At the end of this study, I was able to make two major conclusions. The first is regarding the wood consumption, which is happening every day, not only for major meals but also to prepare tea, to prepare *dahi* (yoghurt), to heat milk, etc. The wood is indeed needed every day and villagers need to have a certain storage in prevention of days where it will rain, when they will receive guests and therefore cook more, but more generally I guess to have the security to assure the next meals.

The other conclusion that I made was regarding the wood collection. The villagers are responsible for the degradation of the forests but they can not be blamed so easily. *“The first priority in the case of such villages -high dependant villages- is to increase the economic ability of the people to purchase alternatives”* (2). The government is offering few if not no alternative to the wood collecting, such as LPG bottles at low price (200 Indian National Rupees \approx 3€). But even with those gas cylinder at low cost, the villagers still go inside the jungle since the wood they can find there is absolutely free of cost. And for most of the families, 200INR can not be spent so easily. If we can provide sustainable alternatives to the wood collecting, many positive things would change in villagers' lives. They would have access to better healthcare, their children would have access to better schools, they would eat more and simply improve their daily lives. The *Lantana Camara* furniture making project, I am sure, can be very useful to achieve his goal. It would also empower women and decrease the amount of work that they have to achieve while they are walking, collecting wood and being attacked in the forests.

I will continue this survey after the end of my internship, because I want this project to be viable and also to introduce the solar cookers in as many houses as possible. I know that to make a stronger report in order to submit it to the authorities concerned, I will have to study the villages on a longer period of time, hopefully during one year, which I intend to do. Those authorities can be The Wildlife Institute of India, the local, national and international press but also to the government of India to give them proves of what is happening in Corbett's forests.

Regarding the Vulture Centre, some things need to be improved, even if the existing structure is really good. Even during the strongest storm I have ever seen, not a drop of water came through the roof. Therefore, the improvements that can be done are more to improve the everyday lives of the people living inside the house. For example, a rubber band could be placed at the bottom of each door to avoid snakes to come in. Since it was not done during my stay, we often put a line of bleaching powder because the smell repulses them.

When the association will have more financial resources, new and final solar panels will need to be installed. The best place to put them would be up from the ground, to avoid the shadow of surrounding plants and trees and to prevent it from getting dirty due to the dust on the ground. Another nice thing that could be done is the construction of a small kitchen and the use of a solar cooker.

APPENDIX B: TECHNICAL PART OF THE GPS ETREX SUMMIT



eTrex® series



Navigation features

Waypoints/icons: Name and graphic symbol
Tracks: Automatic track log; 10 saved tracks let you retrace your path in both directions
Routes: 20 reversible
Trip computer: Current speed, average speed, time of sunrise/sunset, resetable maximum speed, trip timer and trip distance
Map datums: More than 100
Position format: Lat/Lon, UTM/UPS, Maidenhead, MGRS, Loran TDs (Venture, Legend and Vista only) and other grids
GPS performance
Receiver: 12 parallel channel GPS receiver continuously tracks and uses up to 12 satellites to compute and update your position
Acquisition times:
 Warm: Approximately 15 seconds
 Cold: Approximately 45 seconds
 AutoLocate™: Approximately 5 minutes
Update rate: 1/second, continuous
GPS accuracy:
 Position: < 15 meters, 95% typical*
 Velocity: 0.05 meter/sec steady state
DGPS (WAAS) accuracy:
 Position: < 3 meters, 95% typical
 Velocity: 0.05 meter/sec steady state
Dynamics: 6g's
Interfaces: RS232 with NMEA 0183, RTCM 104 DGPS data format and proprietary GARMIN
Antenna: Built-in patch
Power
Source: 2 * AA" batteries (not included)

Physical

Size: 4.4" H x 2.0" W x 1.2" D (11.2 x 5.1 x 3.0 cm)
Weight: 5.3 ounces (150 g) with batteries
Display: 2.1" H x 1.1" W (5.4 x 2.7 cm) high-contrast LCD with bright backlighting
Case: Waterproof to IEC 60529 IPX7 standards
Temperature range: 5°F to 158°F (-15°C to 70°C)
User data storage: Indefinite, no memory battery required

Electronic compass feature (eTrex Summit and Vista only)

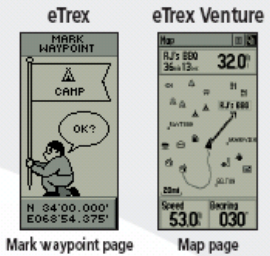
Accuracy: ±2 degrees with proper calibration (typical); ±5 degrees extreme northern and southern latitudes
Resolution: 1 degree

Barometric altimeter feature (eTrex Summit and Vista only)

Accuracy: 10 feet with proper calibration (user and/or automatic calibration)
Resolution: 1 foot
Range: -2,000 to 30,000 feet
Elevation computer: Current elevation, resetable minimum and maximum elevation, ascent/descent rate, total ascent/descent, average and maximum ascent/descent rate
Pressure: Local pressure (mbar/inches HG), 12-hour automatic pressure trend recording

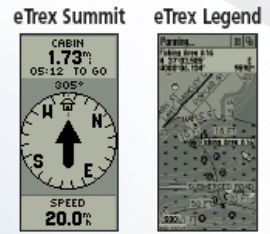
Accessories

Standard: PC interface cable (Venture, Legend and Vista only)
 User's guide
 Quick reference guide
 Wrist strap
Optional: Carrying case
 Holster
 PC interface cable
 PC interface cable with 12-volt adapter
 12-volt adapter cable
 Handlebar mount
 Marine mount
 Automotive suction mount
 Adjustable automotive mounting bracket
 MapSource CD-ROMs
 Instructional video



Mark waypoint page

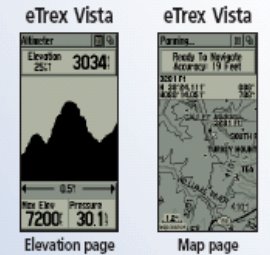
Map page



Compass page

Map page

(shown with optional MapSource Fishing Hot Spots® detail)



Elevation page

Map page

(shown with optional MapSource Topo detail)

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Specifications are preliminary and subject to change without notice.

* Subject to accuracy degradation to 100m 2DRMS under the U.S. Department of Defense Imposed Selective Availability Program.

** These units are also able to transfer waypoints, routes and tracks between the PC and GPS using MapSource™.

Here's how the units are different



	eTrex	eTrex Venture	eTrex Legend	eTrex Summit	eTrex Vista
Waypoints	500	500	1,000	500	1,000
WAAS enabled	yes	yes	yes	yes	yes
database or map	none	city point database	detailed basemap	none	detailed basemap
display resolution	64 x 128 pixels	160 x 288 pixels	160 x 288 pixels	64 x 128 pixels	160 x 288 pixels
battery life	22 hours	20 hours	18 hours	16 hours	12 hours
sensors	none	none	none	electronic compass,	electronic compass,
MapSource® compatibility	limited — able to transfer waypoints, routes and tracks between PC and GPS	some — accepts 1 MB data from the Points of Interest CD**	extensive — accepts 8 MB of downloaded map detail from a variety of MapSource™ CDs**	barometric altimeter limited — able to transfer waypoints, routes and tracks between PC and GPS	barometric altimeter extensive — accepts 24 MB of downloaded map detail from a variety of MapSource™ CDs**

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APPENDIX C: TABLE OF MONTH TIME BASIS DATA COLLECTION REGARDING FIREWOOD

MONTH TIME BASIS DATA COLLECTION REGARDING FIREWOOD : MONTH/YEAR									
Location	Sundherkal	Dhikuli	Khatari	Sundherkal	Dhikuli	Khatari	Sundherkal	Dhikuli	Khatari
Date									
Collection group number									
Male / Female ratio									
Adult / Child ratio									
Approximate age range									
Starting time of party									
Total walking time									
Collecting time									
Total bundles collected									
Material contained									
Estimated bundle weights									
Estimated % of green wood in one bundle									
Habits visited on collection route									
2nd route different from the 1st one?									
Any other endpoint (beside domestic use)									
Any comment									

APPENDIX D: INFORMATION ABOUT COOKING

भोजन बनाना की जानकारी (Information about cooking)

तारीख (Date)									
समय (Time)									
भोजन भोजन बनाना (Dish cooked)									
गठरी जलाऊ लकड़ी का वजन (Bundle weight)									
जलाऊ लकड़ी से भोजन बनाना की संख्या/मात्रा (Number of dishes cooked with the bundle)									
भोजन बनाना का समय (Duration of the cooking)									
अन्य टिप्पणी (Any other comment)									

तारीख									
समय									
भोजन भोजन बनाना									
गठरी जलाऊ लकड़ी का वजन									
जलाऊ लकड़ी से भोजन बनाना की संख्या/मात्रा									
भोजन बनाना का समय									
अन्य टिप्पणी									

APPENDIX E: FIELD SURVEY DATA ON SUNDERKHAL

DATA COLLECTION REGARDING FIREWOOD : SUNDERKHAL				
Location	Sunderkhal	Sunderkhal	Sunderkhal	Sunderkhal
Date	08/06/2009	15/06/2009	30/06/2009	08/07/2009
Collection group number	3	9	6	2
Male / Female ratio	0/3	0/9	0/6	0/2
Adult / Child ratio	3/0	6/3	5/1	2/0
Approximate age range	30	30	30	22
Starting time of party	7:18AM	7:15AM	8:10AM	7:39AM
Total walking time	1H40	1H40	0H20	1H10
Collecting time	2H	1H25	1H15	2H
Collecting time (H)	2	1,42	1,25	2
% people collecting wood among gp	33,33	44,44	100,00	50,00
Total bundles collected	1	4	6	1
Material contained	Wood + grass	Wood + grass	Wet wood	Wood + grass
Estimated bundle weights (kg)	15	30	15	15
Total wood collected for gp (kg)	15	120	90	15
Estimated % of green wood in one bundle	5	10	5	5
Habits visited on collection route	Riverine	Riverine	Sal forest	Sal forest
2nd route different from the 1st one?	NO	NO	YES	YES
Any other endpoint (beside domestic use)	NO	NO	NO	NO
Any comment	<input type="checkbox"/> cheetal AC	<input type="checkbox"/> cross Kosi		<input type="checkbox"/> girl climb very up in tree to cut grass
	<input type="checkbox"/> tiger roar			
	<input type="checkbox"/> cross Kosi			
				<input type="checkbox"/> cross Kosi
				Home construction
				Wood + grass
				30
				30
				100
				Riverine
				NO
				Home construction

APPENDIX F: FIELD SURVEY DATA ON DHIKULI

DATA COLLECTION REGARDING FIREWOOD : DHIKULI						
Location	Dhikuli	Dhikuli	Dhikuli	Dhikuli	Dhikuli	Dhikuli
Date	10/06/2009	17/06/2009	04/07/2009	10/07/2009	17/08/2009	
Collection group number	X	3	2	X	X	
Male / Female ratio		0/3	0/2			
Adult / Child ratio		3/0	2/0			
Approximate age range		30	30			
Starting time of party		8:15AM	8:17AM			
Total walking time		1H	1H			
Collecting time		1H30	1H			
Collecting time (H)	0	1,5	1	0	0	
% people collecting wood among gp		100	100			
Total bundles collected		3	2			
Material contained		Wood	Wood			
Estimated bundle weights (kg)		25	25			
Total wood collected for gp (kg)		75	50			
Estimated % of green wood in one bundle		20	30			
Habits visited on collection route		Sal forest	Sal forest			
2nd route different from the 1st one?		NO	NO			
Any other endpoint (beside domestic use)		NO	NO			
Any comment	<input checked="" type="checkbox"/> no ladies going			<input checked="" type="checkbox"/> no lady is going because it rained all night	<input checked="" type="checkbox"/> no lady is going because it rained for 2 days	
	<input checked="" type="checkbox"/> pugmarks					
	<input checked="" type="checkbox"/> turtle					
	<input checked="" type="checkbox"/> sambhar skull					

APPENDIX G: FIELD SURVEY DATA ON KHATARI

DATA COLLECTION REGARDING FIREWOOD : KHATARI				
Location	Khatari	Khatari	Khatari	Khatari
Date	14/06/2009	29/06/2009	06/07/2009	12/07/2009
Collection group number	7	7	6	X
Male / Female ratio	3/4	3/4	2/4	0/4
Adult / Child ratio	6/1	6/1	5/1	4/0
Approximate age range	35	35	30	45
Starting time of party	6:36AM	6:07AM	6:05AM	6:00AM
Total walking time	1H20	1H	1H	2H20
Collecting time	3H	1H50	3H	2H15
Collecting time (h)	3	1.83	3	2.25
% people collecting wood among gp	100	57	100	100
Total bundles collected	7	4	6	4
Material contained	Wood	Wood	Wood	Wood
Total wood collected for gp (kg)	350	200	300	200
Estimated bundle weights (kg)	50	50	50	50
Estimated % of green wood in one bundle	5	10	10	10
Habits visited on collection route	Teak plantation	Teak plantation	Teak plantation	Teak plantation
2nd route different from the 1st one?	YES	NO	NO	NO
Any other endpoint (beside domestic use)	Sell in Rammagar market	Sell in Rammagar market	Sell in Rammagar market	Sell in Rammagar market
Any comment	<input type="checkbox"/> pay 200INR/month	<input type="checkbox"/> rain during collection	<input type="checkbox"/> no trust	<input type="checkbox"/> no lady is going
	<input type="checkbox"/> throw string + rock to bring down branches		<input type="checkbox"/> think we are FBI	<input type="checkbox"/> because it rained all night
			<input type="checkbox"/> looking at jewelries	<input type="checkbox"/> meet 4 forest guards-tell ladies to leave
		<input type="checkbox"/> run & hide after vehicle sound		<input type="checkbox"/> man on bike abuses women for taking wood

APPENDIX H: INFORMATION ON SOLAR FAN AND LED TUBE LIGHT BY GREEN HORIZONS

LED TUBE LIGHT 12V



 [See larger image: LED TUBE LIGHT 12V](#)

Product Details

LED TUBE LIGHT

- ABS weatherproof molded cabinet
- White diffused LED'S used for homogeneous spectrum
- Suitable for Wall Mounting / Ceiling
- Integrates with Solar Home lighting system
- Eye soothing White Light pleasant for reading or working
- Negligible Maintenance and long trouble free usage



 [See larger image: Solar Fan](#)

Product Details

Solar Fan

- Suitable in places with no or erratic power supply
- Modular, can be integrated in any existing SPV System.
- Universal design can be used as Table Fan/Cabin Fan
- With three Speed regulator
- 12V 10W - 12W Max. current consumption
- Acrylic Plastic blades

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- * Status of tiger and leopard in Rajaji-Corbett Conservation unit, northern India, by A.J.T. John Singh and A.S. Negi, 2002
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Summary of the internship

I did my internship with The Society for Mahseer Conservancy and was based in Ringora village in a place called “Vulture Centre”, Uttarakhand, India. My work focused on the Buffer Zone of The Corbett Tiger Reserve and the link that exists between its surrounding villages and the Corbett forests. The villagers are actually using those forests to collect wood for cooking and grass for cattle. The goal of this study was first to assess the wood collecting of three selected villages and then to propose the villagers alternatives in order to reduce their impact on the forest.

In order to realise it, I went with villagers, mostly ladies, inside the jungle to record several information on their wood collection, to visualise a wood consumption pattern. The next step was to take contact with associations that could provide us alternatives such as solar cookers or would help us to put together a project on *Lantana Camara* weed furniture making.

Another work that I did was to follow and participate to the renovation of an old building used for cattle, in an ecologic way. This building was finally working at very low energy consumption, using solar panel. The all renovation process was made using local knowledge.