Forest Resource Collection Footprints

Study of Karwa, Murpar, Garamsur, Ghatkukada, Umarzari and Pahungaon villages

BNHS India
CONSERVING NATURE SINCE 1883

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Report layout and design: Sanjay Karkare

About the pictures: *All the pictures in this report were captured by the BNHS team in the field when they accompanied villagers in the forest for resource collection. We took permission for the photographs, for the study.*

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Forest Resource Collection Footprints

Study of Karwa, Umarzari, Garamsur, Ghatkukada, Pahungaon and Murpar villages

This study was conducted under the project title Human-Wildlife Coexistence in Central India Landscape: Challenges and opportunities

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INTRODUCTION

Over the last 18 years, the BNHS has played a pivotal role in bridging the gap between the community and forest management in five districts of east Vidarbha through a conservation education unit and the community integration approach. However, the pressures of increasing population in and around protected areas force humans and wildlife to share living places, which has a negative influence on both. According to the Maharashtra State Forest Department's 2017 report, agricultural depredation by herbivores has increased by 6.1 percent, cattle lifting has increased by 8 percent, and human killing by large carnivores has increased by 8 percent.

People living around the forests and protected areas collect various forest produce for daily sustenance. In 2020, the BNHS team collected detailed quantitative data from 229 villages spread across the 5 districts of east Vidarbha. Apart from this data, the team also collected data through various case studies. It was noticed that human imprints are very high in forests and protected areas. Villagers traditionally collect fuel wood, tendu patta, mahua flowers, wild vegetables, grass for a broom, and many other MPFs from the fringe forests near the villages.

The team selected 6 villages from each landscape for an elaborate study to understand forest produce collection, collection patterns, and economics. These villages were selected by the discussion with the Project Tiger administration. The team selected one village from each Navegaon-Nagzira Tiger Reserve (NNTR), Bor Tiger Reserve (BTR), Pench Tiger Reserve (PTR), Tadoba Andhari Tiger Reserve (TATR) buffer, Umred-Paoni-Karhandla (UPKWLS) sanctuary, and Bramhapuri forest division. Aside from that, the team tried to understand the people's lives and their problems as residents in interior villages.

The deep dive started with a request from Dr. Jitendra Ramgaokar, Field Director of TATR. He requested the team to assess the human footprints in Karwa buffer village in TATR's forest. After that team did a detailed study of the remaining 5 villages from other landscapes.

METHODOLOGY

There are two aspects to this intervention which include understanding forest produce collection, its usage by communities, and its impact on tiger habitat through various surveys, and another is ground truthing. The BNHS team accompanied villagers in the forests to understand the patterns of collections. From the month of April to November 2021, the 12-member team completed village footprint surveys in Karrwa (TATR), Umarzari (NNTR), Garamsur (Bor TR), Ghatkukada (Pench TR), Pahungaon (Umred WLS), and Murpar village from Bramhapuri landscapes. The team surveyed every household from the above villages for understanding the forest produce collection. For the qualitative study, the team had group discussions with the village head, women, youth, and forest department staff.

To understand and estimate the actual usage of fuelwood in the village a pilot study was conducted in all 6 villages selected for resource dependence. For this, the BNHS team selected 10 households from each village on criteria of family size and economic condition, and all the sampled households had LPG connections as well. The sampling method is explained in the table below.

Family Size	Agriculture Land	No. of Households
2	0-3 acres	1
2	More than 3 acres	1
3	0-3 acres	1
3	More than 3 acres	1
4	0-3 acres	1
4	More than 3 acres	1
5	0-3 acres	1
5	More than 3 acres	1
6	0-3 acres	1
6	More than 3 acres	1
Total		**10**

As shown in the table the samples from each village were selected for the study. Then fuelwood was weighed and distributed to the households for three consecutive days. The distributed fuelwood weighed 8–10 kg per day for the households, sometimes on the 2nd day,

some quantity of fuelwood from day one remains, so the team used to add on some quantity to the previous allotted stock. The difference between the allotted quantity and the remaining quantity was calculated as the used quantity. Then the average of 3 days of quantity used was considered for the result. The quantity of each family size was then multiplied by 300 days to estimate the yearly consumption of the family size. 300 days for a year was considered due to the usage pattern of the villagers. In summer, the quantity is reduced due to the extremely hot weather. Some villagers move outside for livelihood or other reasons for two months. To estimate the fuelwood consumption of the whole village in a year, the fuelwood quantity utilized was multiplied by the total number of households and again multiplied by 300 days, using this formula the average estimation of yearly fuelwood utilization of the village was calculated. The BNHS team also interviewed each household to access fuelwood consumption.

For the grazing footprint, the team tied a GPS collar to the cattle neck and studied the movement of cattle in the forests for grazing for three days. The team also accompanied the herdsmen throughout the day in all 6 villages. The team noticed a lot of human footprints in the tiger habitat adjoining these selected villages. For small-timber assessment, the team selected the same households where the fuelwood collection survey was arranged. The team conducted an ocular estimation of small timber use with the same sample. For tendu patta and mahua collection, the team collected information from villagers. Also, in Karwa village, the team accompanied the collectors to understand the patterns in summer.

The impact zone (map) for the cattle grazing, tendu patta collection, and mahua collection is calculated using the google earth measurement scale. For the minimum impact zone, the shortest GPS track is considered and for the maximum impact zone, the longest track is considered. The starting point of the track is considered the centroid to calculate and draw the impact zone. The measurement is calculated in the Hectare (Ha) scale to present the impact on land more accurately.

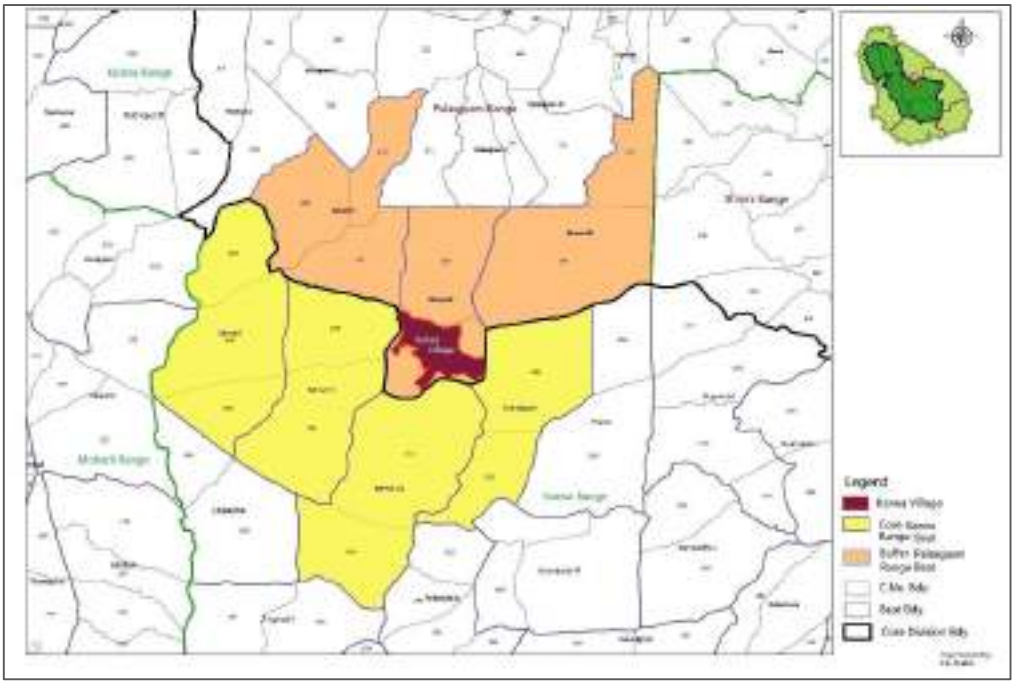
Forest produce is the most important resource for locals who are residing on the fringe of the protected areas

Karwa Footprints

INTRODUCTION

The Karwa comes under the administrative area of tehsil Sindewahi in Chandrapur district, located just on the eastern core boundary of Tadoba Andhari Tiger Reserve. The village covers an area of 293.95 hectares. The Karwa has 164 households in which 262 families reside. Out of which 57.64% of the total population belongs to the scheduled tribe community, 19.45% belongs to other backward classes, and 22.91% belongs to the unreserved category community. Among the total households, 94.47% are below the poverty line. Around 63.27% of the total population of the village is literate (source micro plan by tiger project). The village has more than 300 cattle. Paddy is a single crop produced by farmers. Agriculture is the primary source of occupation for more than 70% of households. Moreover, villagers are largely dependent on forest produce for livelihood. Karwa is surrounded by dry mixed deciduous forests type, majorly consisting of bamboo mixed forest.

This village is deep inside the Tadoba Andhari Tiger Reserve. This village is located 12 km from Palasgaon and 14 km from Shivani village. There is a primary ZP school in the village. The area is within the Palasgaon TATR buffer range. In this village, Karwa I (991.89 Ha), Karwa II (614.23 Ha), and Karwa III (1121.79 Ha) are the buffer beats. Karwa I (1057.03 Ha), Karwa II (930.89 Ha), Karwa III (1047.18 ha), and Anandgaon (796.66 ha) adjoined the village in the center. The total area of all seven beats is 6,556 ha. Traditionally, communities have relied heavily on forest resources that are right on the doorstep. Besides collection, there is constant two-wheeler and four-wheeler traffic on Shivani and Palasgaon roads. Karwa and Rantalodhi villages are inextricably linked with various activities. Encroachment, open defecation, and movement for mobile networks are all impact-generating activities in this village.



Map 1: Karwa village boundary and buffer-core beats

FUELWOOD COLLECTION

Collection Pattern

Fuelwood collection begins after the paddy season in this village. Most of the fuelwood is collected in the winter and summer as well. The women in this village are involved in fuelwood collection. They collect fuelwood from the forest in groups of four to ten. Some small groups collect fuelwood three to four times a day as the forest is at their doorsteps. The women spend around three to five hours a day collecting fuelwood in the forest.

The women in Karwa have no uncertainties about the LPG cylinders, as the fuelwood is always available in their homes

According to the results from the household survey of the team, out of 164 households, 162 households collect fuelwood from the forest. Of these 162, 13 households collect fuelwood from the core area, 62 households collect fuelwood from the buffer area and the rest of the households collect fuelwood from both the core and buffer areas. Karwa villagers visit 15–20 times forest a year to obtain fuelwood. The majority of the fuelwood for a year is collected exclusively during the summer. The households' fuelwood consumption patterns varied in several ways. Fuelwood is primarily used for water heating. Some families cook specific food on chulha, such as *daal* and *chapati,* since they believe this food required more LPG. Overall, all households use fuelwood, according to their needs, with the household's economic situation playing a significant effect on fuelwood consumption.

LPG is distributed to 100% of households in Karwa through the forest department's SPM scheme

LPG is distributed to 100% of households in Karwa through the forest department's Shyama Prasad Mukharjee Jan-Van-Vikas Yojana (SPM). According to household survey data, 142 households cook their meals with LPG partially, whereas 16 households cook their meals with fuelwood only. Meal preparation is done with gobar gas in 2 households. All 162 households use chulha for heating water. In the overall scenario, 162 households harvest fuelwood for daily use for heating water and preparation of meals as well. In every household, there is a stock of fuelwood. The women have no worries about the LPG cylinders as the fuelwood is always available in their homes. Fuelwood collection does not include a direct economy, however, fuelwood harvesting is linked to the household's economy in some way. Even after receiving cylinders, they want to use them for extended periods by cooking meals partially on chulha i.e., saving money on cylinders by supporting them with fuelwood.

Impact

Karwa residents travel 1 to 3 kilometers to collect fuelwood from the forest. One household collects 21 to 30 kg of fuelwood every day for 15 to 20 days in a single stretch. Karwa residents walk an average of 2,800 hectares in their fuelwood harvesting zone. While collecting fuelwood, villagers disturb this vast area, which includes both the core and buffer beats of the Tiger Reserve. The team found that the household having the least family members in our sample i.e., 2, averagely utilizes 2–4 kg of fuelwood per day for hot water bathing and cooking, while the largest family size of our sample i.e., 6 averagely utilizes 4–6 kg per day for heating of water and cooking. All these families are using fuelwood for chulha though they have LPG connections.

Around 100% of households participate in the collection process, which is why fuelwood collection has a greater impact on the forest than any other resource. The team experimented to calculate the fuelwood demand of Karwa village and annual fuelwood extraction by selecting 10 households based on family size and annual income from agriculture. According to the information provided by the respondents, the village extracts 40.87 tons of fuelwood every year. However, our study found that the Karwa villagers use 119.32 tons of fuelwood per year.

When compared to other resources, fuelwood harvesting is the most common activity carried out by the villagers. Fuelwood collection hurts forest regeneration and makes the forest thinner. Though every household has LPG, the amount of fuelwood collected has not reduced significantly. During the hot summer months, people used to remove branches and occasionally entire trees to convert them to fuelwood. Fuelwood harvesting is unquestionably contributing to habitat destruction in the surrounding forest.

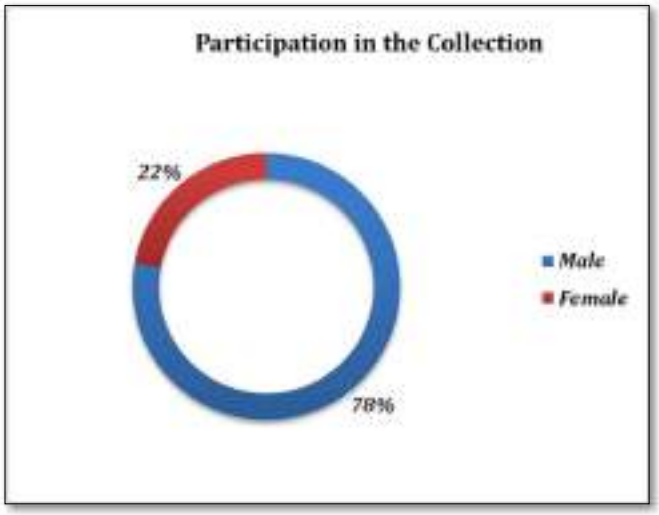
BNHS study found that the Karwa villagers use 119.32 tons of fuelwood per year

SMALL TIMBER COLLECTION

The small timber is primarily and widely used for cow shelters and farm fencing. Considering the circumstances in Karwa, the village still has raw houses constructed of small timber. The small timber is also used to create watchtowers, known as *Maara* in the agricultural field, agricultural tools, *Maandav*, and other items. The small timber is replaced generally in 8 to 10 years.

Collection Pattern

Small Timber collection follows a similar pattern throughout the village. Summer is the season for collections. In certain cases, the timber is also collected in winter and monsoon. They collect timber from the forest solely or in small groups.



According to the results from the household survey, 140 of the 164 surveyed households obtain small timber from the forest. The collection takes place in both the core and buffer of the tiger reserve. 15 households gather small timber from the core area, 55 households from the buffer, and 70 households collect from both the core and the buffer randomly. Most of the small timber harvesting is transported on cycles and headloads. Villagers go to the forest 4-5 times a year on average. The most preferred species are *Garadi*, *Dhawada*, and *Bhera*.

For the households and cow shelter construction, they mostly prefer "Y" shape timber to be used as the main pillars of the structure. The decayed and old small timber is then used as fuelwood in chulha and bonfires.

In Karwa 140 households utilize it for home construction, whereas 57 households use it to make agricultural appliances, 73 households use it for cow shelters, 129 households use it for *Maandav,* 40 households utilize it for watchtowers i.e., *Maara,* and 25 households utilize the small timber in fencing of the farm. Small timber harvesting falls under the category of non-commercial collection. The collection does not provide any direct benefit. However, the harvest is carried out to meet their construction requirements.

Impact

According to a household study, villagers stroll an average of 3 km to the core, and 4 km in the buffer to collect small timber. In this scenario, villagers influence a 3 km radius around the village for small timber collection. On average, Karwa villagers walk around 2,800 hectares in the surrounding forest for small timber collection which poses a high disturbance to the forest of core and buffer.

For the households and cow shelter construction, villagers mostly prefer "Y" shape timber as the main pillars of the structure

MAHUA FLOWER COLLECTION

In the 12 beats of the Palasgaon buffer range of TATR, there are 1,245 trees of Mahua (source TATR). Karwa village is surrounded by 3 beats of buffer and 4 beats of the core. There are 621 Mahua trees in 3 beats of Karwa buffer whereas no data is available on core beats.

Collection Pattern

In the month of April 2021, the BNHS team joined a group of villagers to study the collection pattern of Mahua flowers. During the collection, a group of 2 to 6 persons visited the core and buffer forest every morning between 6 and 7:45 am. The group included girls, women, and men between the age range of 14 and 65. In comparison to men, the percentage of women was higher. Each carried its own set of supplies, which included a large basket, a small basket, a lunch box, a water bottle, a shirt-pant, and a bag. Women used to go to the forest in their regular clothes (sarees), but before collecting flowers, they wore shirt-pants on their saree and began the collection. The shirt pants make them easy to bend over, sit down, and work without getting their garments stuck. While collecting, all the women gathered, beneath the same tree, while one lady or person in the group looked for a nearby tree.

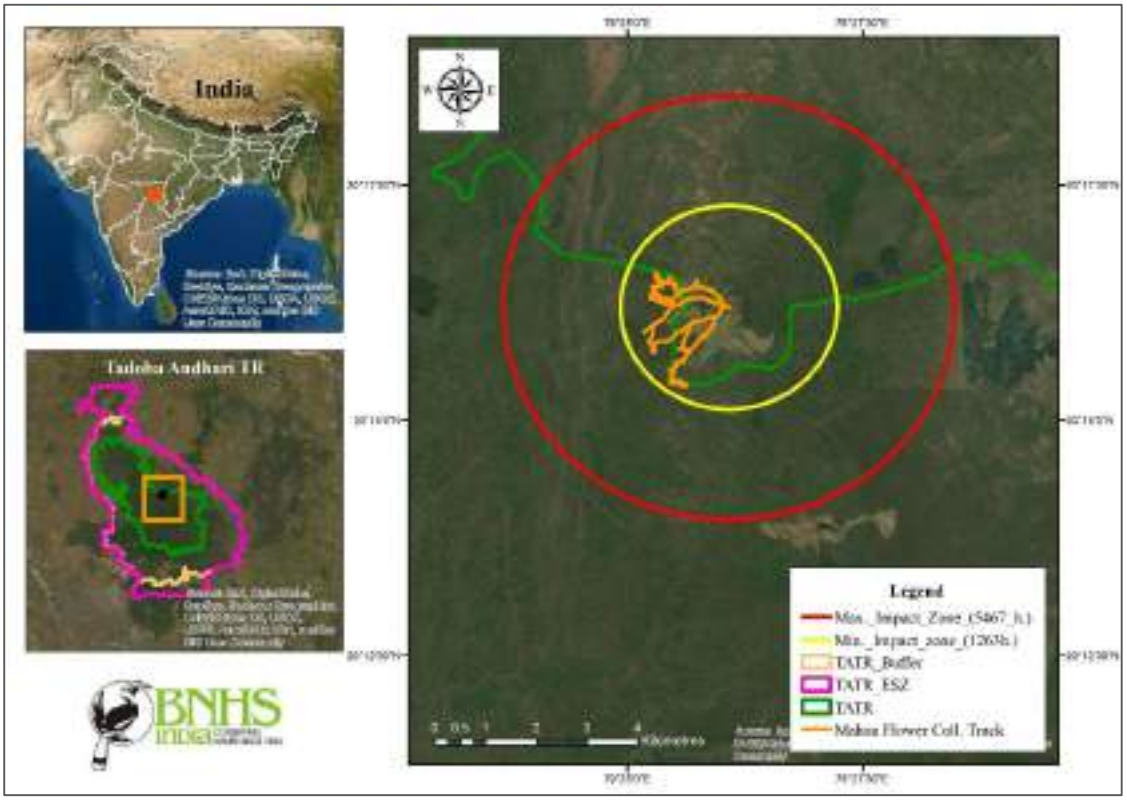
While collecting, the group used to shout so that no wild animals would approach them. At 2 pm, the group took a 45-minute break for a meal. Following lunch, they went in search of a new tree and start the collection. The distance between the two trees varied as well, depending on the location. In the core area, the average distance between two plants was 50 to 100 meters, while in the buffer area, the average distance was 100 to 130 meters. The group collected both wet and dry flowers that were lying on the ground. Most of their time is spent bending, sitting, and picking flowers. They used to collect small baskets by bending or sitting down till the basket was full during the collection. Between 5:30 and 6:00 pm, the group returned to the village.

The flowers were then dried in the sun for two to three days on the roof of the house or in the yard. These dried flowers were packaged for sale in a bag. The BNHS team kept track of the number of flowers picked each day as well as the time it took to collect them. The group spent an average of 8 to 10 hours in the forest, according to the findings.

In 2021 summer, 167 women and 40 men from 145 families went for collection in the core and buffer forest. This year Mahua flower yield is less than last year. By the end of the season, 40 to 45 families had collected Mahua flowers. During the 25-day flowering season, a household might earn anywhere between Rs. 2500 and Rs. 7000. Some families collected flowers and kept them at home, while others sold them and made money at once. Those that keep the flowers sell them when the price is high or they need money. Whether the flowers are moist or dried when sold determines the price. This year's flowers cost between Rs 30 and Rs 45 per *payali* (Local measuring unit). The Mahua traders come from the villages of Navargaon, Ratnapur, Shivani, Wasera, and Talodhi and purchase dried flowers from the villagers.

Impact

The BNHS team took 4 GPS tracks of the Mahua flower collection which is in the core area of the tiger reserve. Six persons traveled 7 km two ways and spent 9 hours in the forest collecting 37 *payali* of Mahua flowers in 5:40 hours on the first day of collection. Two persons traveled 3.94 km and spent 4:35 hours in the forest on the second day, collecting 12 *payali* of Mahua flowers in 2:45 hours. Six persons walked 7.23 km and spent 9:15 hours in the forest on the third day, collecting 48.5 *payali* Mahua flowers in 6 hours. Six persons traveled 5.49 km and spent 10 hours in the forest on the fourth day, collecting 39.5 *payali* of Mahua flowers in 6:25 hours.



Map 2: Mahua flower collection tracks

Through our quantitative household survey, it was clear that about 145 families were involved in the Mahua collection. These people collected flowers from the buffer as well as the core area.

The information was given by the villagers that the people from Palasgaon, Piparda come to Karwa buffer beats for the collection of flowers which creates competition. To avoid this tussle, Karwa villagers collect Mahua flowers from 7 beats of core and buffer area. More than five thousand and a minimum of one thousand ha of forests are disturbed by these activities. Around a 4.5 km radius of the forest is impacted by the villagers. Throughout the day, the villagers are in the forest in the peak summer which creates a huge disturbance in the forest.

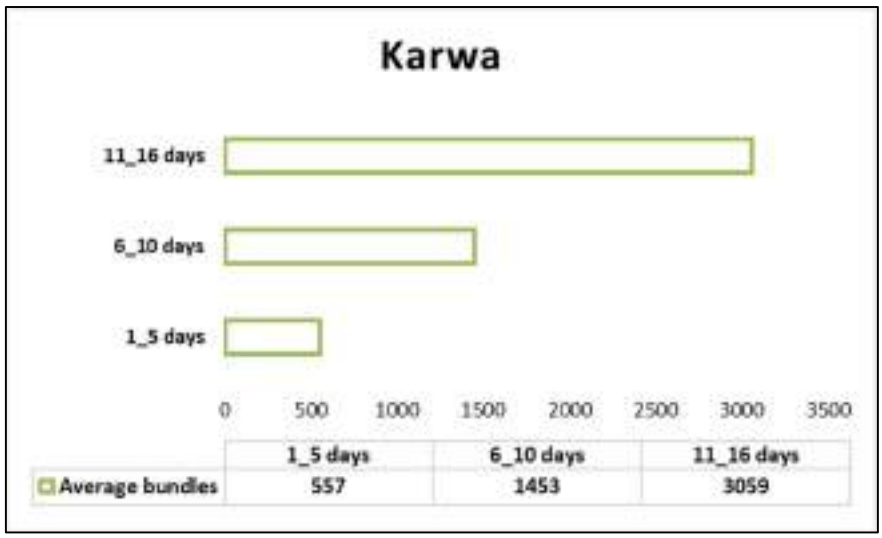
TENDU PATTA COLLECTION

Collection Pattern

The Karwa village has no tendu patta collection center- *phadi*, as it is on the fringe of the core boundaries of the tiger reserve. However, the people collect the tendu leaves and deposit them at the Gondmohadi village collection center which is 13 km from Karwa. These collected leaves are transported to the collection center by a tractor.

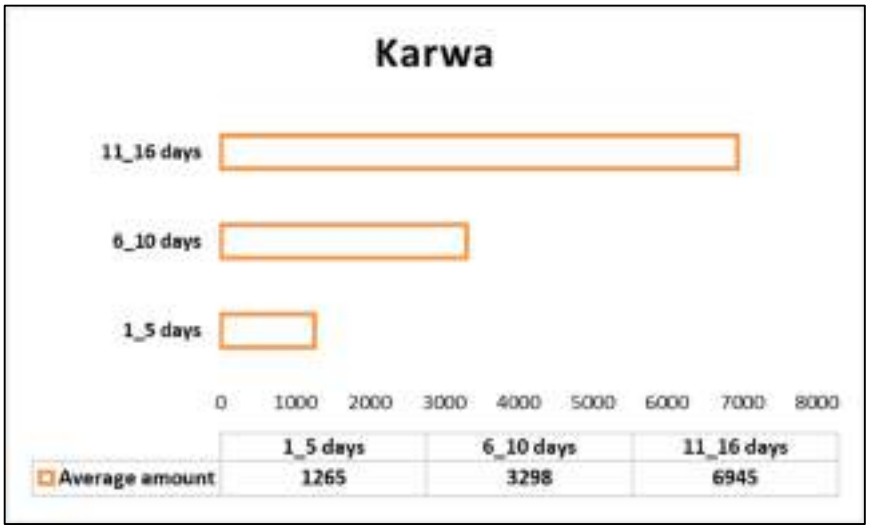
The BNHS team conducted an exercise to better understand the tendu patta collection pattern in Karwa. The collection group consisted of three to six people, including girls, women, and men ranging in age from 15 to 50 years. While collecting, three to four women cut the leaves of a single tree simultaneously, women cut the leaves of trees as tall as they can reach, while men climb the tree and cut the branches of the trees with an ax and bring them down. Women and girls gather leaves from the branches that have fallen. When making bundles (puda), small, young leaves are discarded. When they pick the leaves, they wrap them in cloth or the sari and place them around their waist. The leaves then tumble into the gunny bags with them, and they begin gathering again. They repeat this practice 8-9 times. After returning home, it takes 2 to 3 hours to make the puda. Collectors deposit puda in Gondmohadi village. In 2020, 151 families were involved in the tendu patta collection from Karwa village. In 2021 this number went down to 122 families. All collection records of the families are with the Palasgaon range office of Tadoba buffer.

According to the team, on average, one person plucks tendu leaves to make 125 to 250 puda (70 leaves in a puda) per day. In 2020, villagers collected 2,98,555 puda, and in 2021, they collected 3,02,700 puda. In the season of this year, a single-family makes a minimum of 90 and a maximum of 9000 puda on average. A single household received between Rs. 200 to 20,000 on average, depending on the number of people and days participated in the collection. From tendu collection, Karwa villagers received Rs. 6,56,821 in 2020, and Rs. 6,87,129 in 2021 (TATR source).



Average bundles collected days

In a 1_5-day slot in Karwa village, the average collection was 557 bundles, whereas, in a 6 to 10 days slot, the collection raised to 1,500 bundles on average. In the 11–16 days slot, the average was highest at 3,000 bundles.



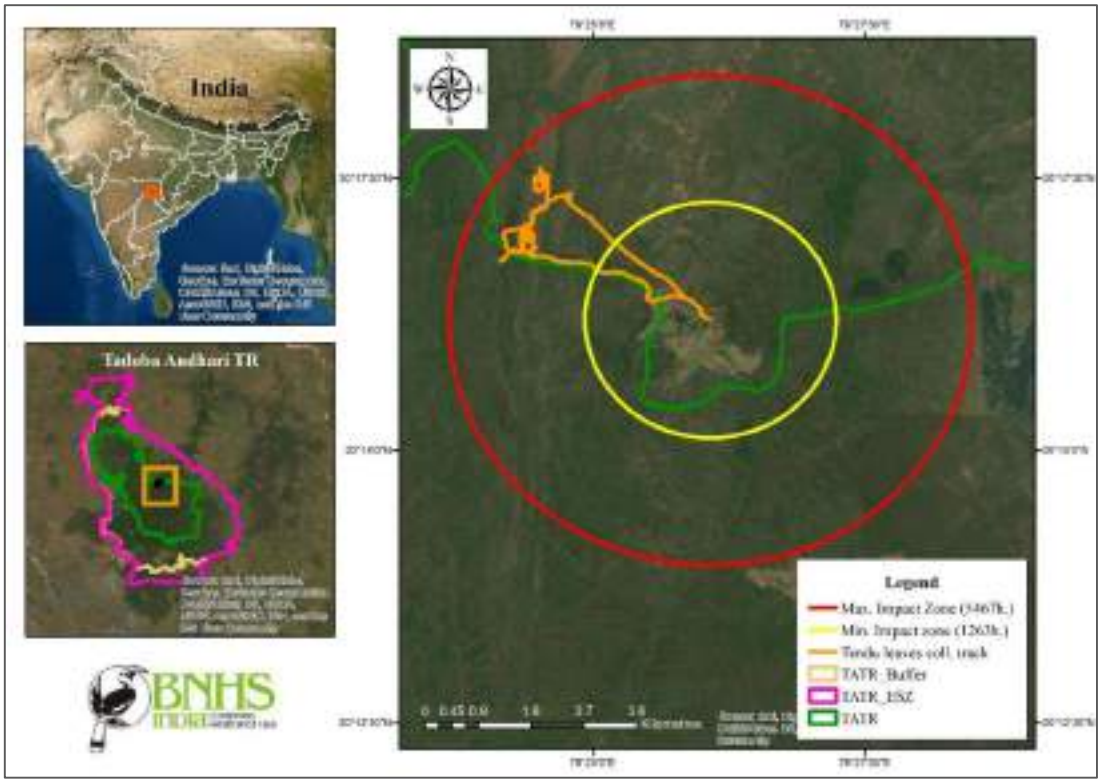
Average income on collection days

1–5 days slot, the income was Rs.1,265, whereas for 6–10 days the income was Rs.3,298, and in the 11–16-day slot, the income was highest at Rs.6,945.

Impact

Tendu patta was harvested by Karwa villagers from both the buffer and core zones of forests. It has been noticed that when tiger project staff acts against villagers found collecting patta from the core area, they shift to the buffer area. In four days, the team accompanied patta collectors in various directions.

On the first day of this four-day collection, the villagers traveled 10.6 km back and forth. They traveled 9.87 km on the second day, 11 km on the third day, and 9.75 km on the fourth day. According to the GPS track, the villagers spent most of their time on the core buffer boundary. It was observed that these locals spent 7 to 8 hours in the jungle collecting patta. The actual collection time was 4 to 5 hours. It has been found that when the locals pluck the tendu patta, they cause significant damage to the tree. The men in the group climb the tree and abruptly chop the branches. It has also been noticed that they cut a medium-sized tree for the collection. The team noticed that there is no sustainable harvesting pattern in the collection. The collectors attempted to obtain as much as possible in as little time.



Map 3: Tendu patta collection tracks

Karwa villagers spent 7 to 8 hours in the jungle collecting patta. The actual collection time was 4 to 5 hours

TENDU FRUIT COLLECTION

Tendu fruit, also known as *Tembharu*, is one of the most popular MFPs among the people who live in nearby forests. In the month of April to May, people collect these fruits from the forest. Tendu fruits became threatened as a result of the overharvesting of tendu trees. The villagers gather tendu fruits from deep within the forest. These tendu fruits are harvested for personal consumption as well as to sell.

Collection pattern

It was known from locals in Karwa that most of the villagers gather tendu fruits from the buffer and core area. They primarily collect these fruits for their consumption. The BNHS team conducted a four-day investigation of fruit collection patterns in Karwa this summer. The team also utilized GPS to follow the collector's route. During the four days, the team took four tracks.

It has been observed that during the fruit collection season, 7 persons collected the tendu fruits for 9 days for commercial sale. This is not a traditional collection pattern, but due to the good harvest this year, these villagers have picked and sold these fruits. They leave for the forest around 6:30 am and return by 10:30 pm. These individuals used motorcycles for collection in the core area (near Palasgaon Shingru village). They parked the motorcycles and began searching for tendu trees. They are already aware of the location of the tendu trees. They normally go under 20 to 25 trees in a day to harvest tendu fruits, and they collect them in the same place every day. While collecting, they climb the tree, bring down the branches, or a heavy stone is flung with full power at the bark of the tree. The tree vibrates as a result, and the fruit falls off. They then gather the fruits. These fallen fruits are collected in a bag. It has been revealed that they pick 40 to 55 kg of tendu fruits a day. They went to over 20 trees for the same drive. These tendu fruits were harvested and sold in Navargaon, Ratnapur, Shivni, and Nanded villages which are 20–30 km away from Karwa.

In Karwa, according to our household study, 121 families pick tendu fruits for their consumption. The flavor of this fruit is particularly popular among the locals. This year the production of tendu fruits was abundant, and several people harvested them for commercial purposes. It was experienced that the majority of these tendu fruit collectors are poor or landless. A group of seven persons collected a total of 873 kg of fruits and earned Rs. 22,800 by selling them at Rs. 30/kg in above said places.

A group of seven persons collected a total of 873 kg of tendu fruits in Karwa and earned Rs. 22,800

Impact

On the first day of the four-day collection activities, 7 persons traveled 12.5 km, spent 4 hours in the forest, and collected 100 kg in 3.15 hours. The following day, three persons drove 14 km and spent 4:25 hours in the jungle collecting 50 kg of tendu fruits. The actual time of collection was 3.50 hours. On the third day, three persons walked 19 km and spent three hours in the forest, collecting 43 kg in 2.15 hours. On the fourth day, three persons went 12.6 km and spent four hours in the forest, collecting 45 kg of tendu fruits in 3:25 hours. It has been observed that people walk a total of 12 to 16 km each day to pick tendu fruits.

The tendu fruit collecting pattern is distressing. They throw big stones at the tree's bark, which impedes and harms the tree. This is an extremely ruthless harvesting approach. These villagers disrupt the pristine tiger habitat by seeking tendu trees and collecting fruit. This tendu fruit is particularly popular among all herbivores as well as sloth bears. These animals are deprived of them throughout the crucial summer months due to the massive harvesting.

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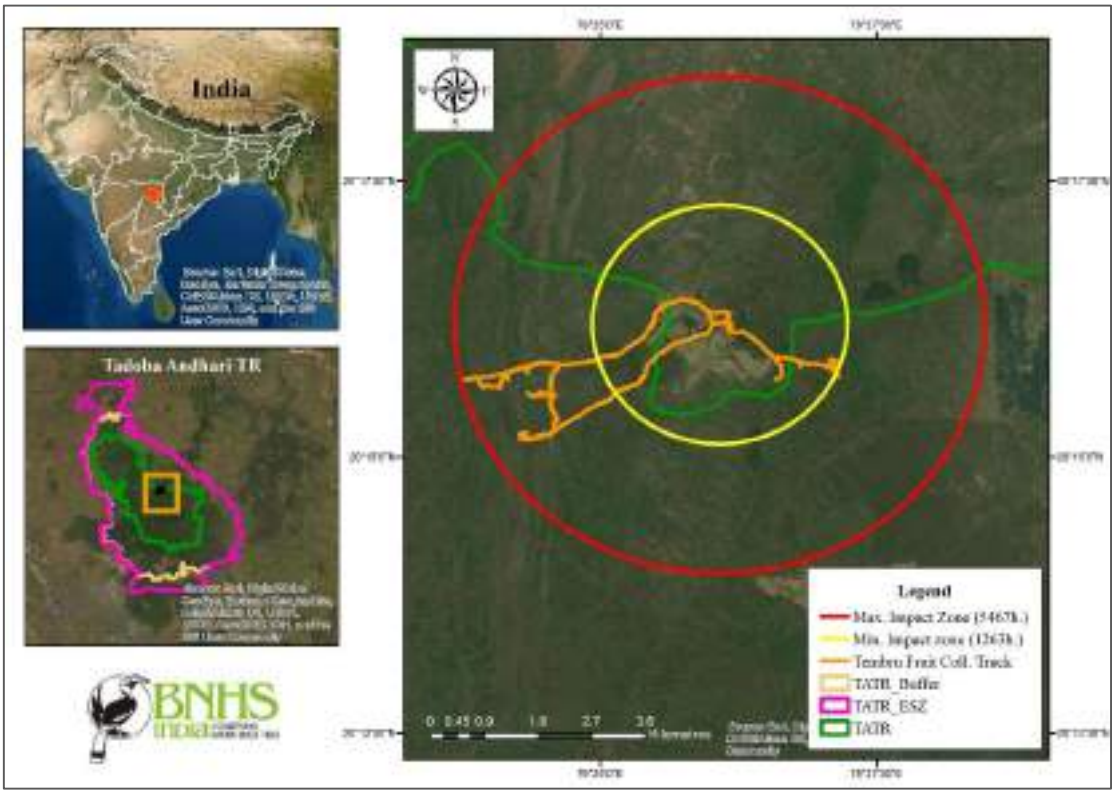


Map 4: Tendu fruit collection tracks

The tendu fruit collecting pattern is distressing. Collectors throw big stones at the tree's bark, which impedes and harms the tree. This is an extremely ruthless harvesting approach

WILD VEGETABLE COLLECTION

The residents of Karwa harvest a variety of wild vegetables for their consumption. The team convened a gathering of women's Self-Help Groups (SHG). During the group discussion, the team learned that people consume around 17 different varieties of wild vegetables in this village.

Collection Pattern

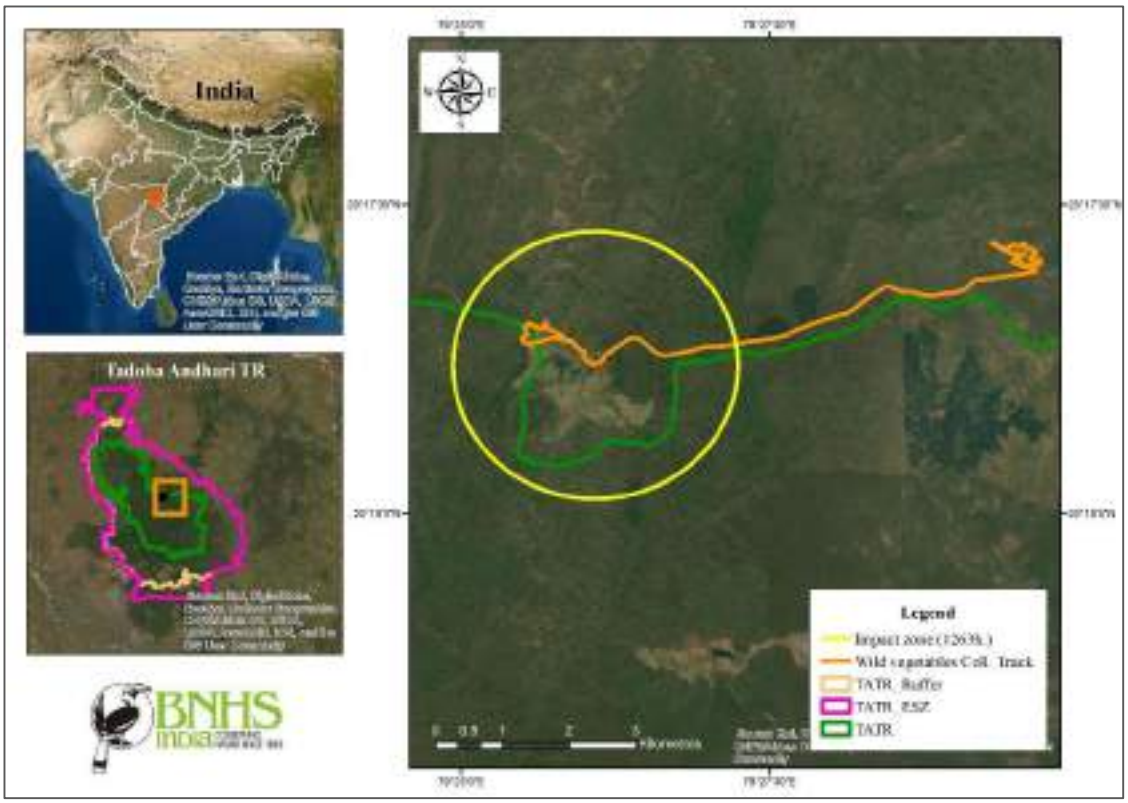
Except for the Kuda flowers, which bloom during the summer season, most of the wild vegetables could be found in the forest from mid-June to the first week of September. According to the residents of Karwa, they do not spend as much time harvesting wild vegetables as they do harvest with other resources. Most of the time, the collection is both opportunistic and deliberate.

Except for Kuda flowers, which bloom during the summer season, the rest of the wild vegetables could be found in the forest from mid-June to the first week of September

Wild vegetables are found in a specific area in the forest. The women from Karwa travel around 1-2 km of the area surrounding the village to gather wild vegetables. They collect an average of 500 gm of a certain wild vegetable at a time. Curry and fried vegetables are mostly made with the leaves of specific vegetables, with a few exceptions when stems, flowers, and pods are used (e.g., Bamboo shoots, Kuda flowers, tubers, and pods). 151 households pick wild vegetables from the forest and forest edges, according to data from a household survey and all of them harvest wild vegetables for self-consumption. The wild vegetable collection is categorized as a non-commercial collection in Karwa village. These vegetables are mostly collected by the villagers as it is seasonal food. According to veteran respondents, wild vegetables were a component of their daily meals in the 70s.

Impact

The collection disrupts an average of 1200 hectares each season to harvest these vegetables. This is a seasonal collection; therefore, the frequency of visits is lower than for other resources, but the number of households collecting is enormous, which caused a disturbance in both core and buffer forests.



Map 6: Wild vegetable collection tracks

CATTLE GRAZING

For grazing cattle, the locals rely heavily on the nearby buffer forest. There used to be herdsmen in Karwa ten years ago. There was a problem with grazing after the herdsman's death. The livestock owners were unified in their choice to take the cattle for grazing on their own.

Karwa is classified into two communities: tribals and Marars. For grazing, two groups were formed from these two communities. The BNHS team fitted a GPS collar belt around the neck of a cattle and accompanied the cattle owners into the forest to understand the grazing pattern. Cattle owners release their cattle for free grazing at 9 am in the summer. When the cattle leave the house, they drink from the yard before making their way to the local lake. Other cattle from the village also arrive at the lake area, where they begin their grazing. They continue to eat grain, leaves, and grass on the remains in the agriculture field. They sip water from the puddles in the field and the nalla as they proceed. During the summer, cattle consume water four times. Cattle graze near the village's farm fields and water features. From 3:30 to 4:00 pm, the cattle return home.

During the monsoon, Cattle graze inside the buffer forest. Cattle feed on bamboo shoots during the rainy season. It has been observed that one cattle consume 20 to 25 bamboo shoots every day. Natural salt from the soil is also licked by the cattle. They eat a variety of grasses as well. A bell was tied to some notorious cattle in the herd to keep them under control. The owner locates the cattle in the deep forest during the monsoon based on the sound of these bells. Owners avoid taking cattle to the core since they are not compensated in the case of an accident. The cattle are pulled out on the way back after 2 pm, and they return to the village after 4:30 pm. As they stroll through the deep forest, the owners make loud noises to each other. During grazing, the livestock owners pick wild veggies. Herdsmen chat loudly when grazing and avoid resting in dense areas.

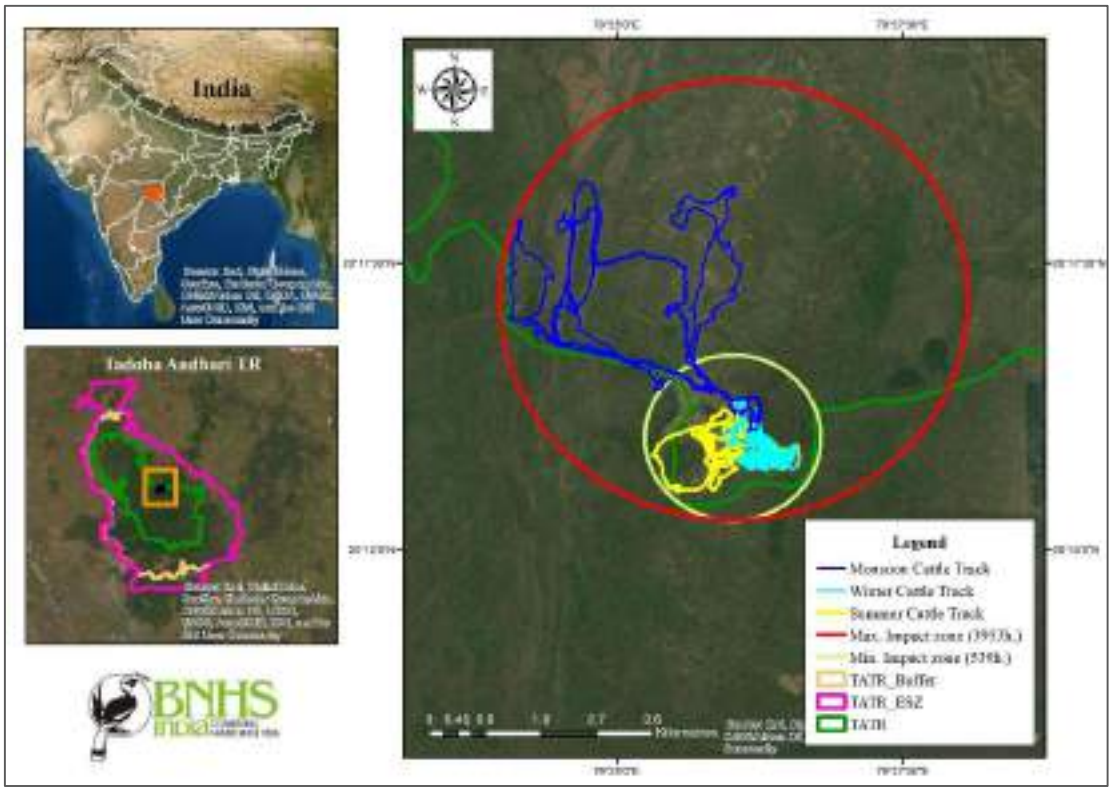
During monsoon, the cattle owner locates the cattle based on the sound of the bell tied to their neck in the deep forest

In Karwa 79 families own cattle. In the tribal community, there are 140 cattle (55 cows, 48 bulls, and 37 calves) in 35 families, and, in the Marar community, there are 172 cattle (67 cows, 68 bulls, and 37 calves) in 44 families, out of a total of 312 cattle (122 cows, 116 bulls, and 74 calves) are in the village. There is a rotation system of grazing in these two communities. 4 people from the tribal and 5 people from the Marar community (a total of 9) go for grazing daily. No one in Karwa village nurtures cattle for milk. Only the cow dung was gathered by villagers for agriculture. This dung is dumped outside the house. This excrement is dumped in paddy fields during the summer.

Impact

It is observed in our study that, the cattle graze for approximately 6 hours each day during the summer. In the summer, cattle can move from 5.5 to 7.5 km for grazing in a single day. During the rainy season, the cattle graze for around 9 hours. During this season, they trek 15 km into the forest to graze. Even though the forest department staff forbid the owners from entering the core area, they do so for grazing during the monsoon.

In 2018-19, there were 35 cattle deaths in the village's surrounding forest, both core and buffer. The tiger (32) and leopard (3) killed most of the cattle. In 2019, there were 45 cattle kills, of which 42 were killed by tigers and three by leopards. In 2020, a total of 20 cattle were killed of which 18 cattle were killed by tigers and 2 by a leopard.



Map 7: Cattle grazing tracks

Resource collection schedule of Karwa village

Resource	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Fuelwood	-	-	✓	✓	✓	✓	-	-	-	-	-	-
Bamboo	✓	✓	✓	✓	✓	-	-	-	-	-	✓	✓
Small Timber	-	-	✓	✓	✓	-	-	-	-	-	-	-
Zadni Gavat	✓	-	-	-	-	-	-	-	-	-	-	✓
Grazing		-	-	-	-	✓	✓	✓	✓	✓	✓	-
Mahua flowers	-	-	-	✓	-	-	-	-	-	-	-	-
Tendu Patta	-	-	-	-	✓	-	-	-	-	-	-	-
Tendu Fruit	-	-	-	✓	✓	-	-	-	-	-	-	-
Wild Vegetables	-	-	-	-	-	✓	✓	✓	✓	-	-	-

Small traders from nearby villages collect forest produce from Karwa

Murpar Footprints

INTRODUCTION

The Murpar village is in the Sindewahi Range of the Bramhapuri forest division of Chandrapur district. The village is approximately 8 km from Sindewahi Tehsil and is surrounded by dense forest. The main occupation of the village is paddy farming followed by labor work. The village is highly dependent on forest resources like fuelwood, tendu patta, and mahua flowers. Also, some of the households are involved in fuelwood selling as a secondary business. The area is under territorial forest division and the scale of conflict is very high as compared to other resource footprint villages we studied. The village has a primary school. For higher schooling, the students go to Maregaon and Sindewahi. The forest beat guard does not stay in the village. The micro plan of the village is prepared by the Bramhapuri forest division.

The team conducted a household survey of 67 households, which is a 100% sample, to determine the village's footprint and impact on the forest. The household survey was the main activity, during which the team collected quantitative data on livelihoods, economy, forest resource collection, and human-wildlife interactions. Also, the team tracked cattle movement for three days using GPS and observed their pattern on a single day accompanying herdsman.

The Murpar village is under a territorial forest division of Bramhapuri and the scale of conflict is very high as compared to other villages we studied

FUELWOOD COLLECTION

Fuelwood is the most often harvested forest resource in Murpar village, as it is used by every household for heating water and meal preparation during livelihood downtime. Throughout the year, fuelwood is used to heat water, and some households engage in commercial fuelwood business.

Collection Pattern

Fuelwood collection is done mostly throughout the summer. During the summer, a total of 39 households collect fuelwood, whereas 25 households collect fuelwood in both the summer and winter seasons. Because the settlement is surrounded by forest, the village's dependence on fuelwood is greater, as they can obtain fuelwood easily. In the village, 44 households have both men and women gathering fuelwood, with 13 households having just women and 7 households having primarily men harvesting fuelwood. Minors are also involved in the collection of fuelwood in 8 households according to household data. The most used method to carry fuelwood is headload which is used by 36 households. The cycle is frequently used by 5 households, whereas 23 households use cycle and headload methods simultaneously.

Minors are also involved in the collection of fuelwood according to the data

In Murpar, 13 households are involved in the commercial selling of fuelwood. Fuelwood is collected on bicycles and later sell to Sindewahi town and occasionally small hotels or dhabas

According to the results of the household survey, all the households bring fuel wood from the forest. Most of the fuelwood collects in groups. The most used species as fuelwood are *Aien, Garadi, and Kukudranji.* The fuelwood is used for heating water and preparation of *Chapati*. To save money on the cylinder refill, they usually prepare a one-time complete meal on chulha during the winter season. Around 13 households are involved in the commercial use of fuelwood, according to residents. They sell wood for Rs 200 for 50 kgs. Fuelwood is collected by these households on bicycles and later sell to Sindewahi town and occasionally small hotels or dhaba. This activity is primarily carried out in the months of November, December, and January because people do not have as much work following the Kharif crop season. Fuelwood collecting is a village-wide activity involving the community of the village. The forest department has provided LPG connections to 62 households. But, only 29 households prepare meals solely on LPG, whereas 35 households use LPG and chulha simultaneously, whereas 5 households still do not have LPG and rely on chulha for preparing meals. However, chulha is primarily used for heating water in all 67 houses.

Impact

Residents of Murpar walk 1 to 4 km surrounding the village to harvest fuelwood. They have an impact on a 1,275-hectare forest area nearby. Throughout the year, households collect 11 to 30 kg of fuelwood on an average for 11 to 25 days. Going into the forest is more common than any other resource for fuelwood. The people of Murpar utilize 117 tons of fuelwood every year, according to our study. Due to the lack of strong protection measures, fuelwood utilization is higher than in other villages surveyed. Locals disturb a large area while collecting fuelwood, and they typically cut down entire trees to obtain fuelwood. The ways of harvesting fuelwood and the amount used are causing damage to the surrounding forest, and the frequency of fuelwood collection visits invites conflict with large predators.

Chulha is primarily used for heating water in all 67 houses in Murpar

SMALL TIMBER COLLECTION

Small timber is primarily used in Murpar for household construction and pandal (*Mandav).* As required, the timber is replaced between a 1 and 4-year schedule. However, the timber used in household structures is replaced every 10-15 years on average. The village has Pigeon pea production during the Kharif season, so to watch over the crop some households utilize it for the construction of a watchtower locally known as *Maara.*

Collection Pattern

According to the results from the household survey, 19 of the 67 surveyed households obtain small timber from the forest in the summer. Most of the small timber harvesting is done with a headload. Villagers visit the forest 5 times a year on average to harvest small timber and it takes an average of 3 hours for the collection. Men are mostly involved in this timber collection in all 19 households whereas women also participate in the collection from 7 households. The most preferred species as the small timber are *Sag, Khair,* and *Garadi*. Of the 19 households, 17 of the households utilize it for home construction, whereas 5 households use it for agricultural purposes, 6 use it for cow shelters, 8 utilize it for a watchtower and 7 households utilize the small timber in *Mandav.*

Impact

To harvest small timber the villagers of Murpar move in a range of 3.68 km from the village. They came across around 700 hectares of area in the forest while searching for the timber.

TENDU PATTA COLLECTION

Tendu patta again is the major source of income and the highest collected commercial resource around each household of Murpar. The economy of tendu patta is larger than any other resource.

Collection Pattern

The tendu patta collection involved 63 households out of 67 households, according to household surveys. A household spends an average of 6 hours every day for 14 days collecting tendu patta. They searched a 6-kilometer region on average for tendu patta. In 56 houses, men and women were equally active in the collection process, with 3 households having only men involved in the collection process and 4 households having only women participating in the collection. A household collected 210 bundles on average per day. When asked more specifically about the collection process, some households stated that they began going towards the forest from 4:30 to 5:00 am before sunrise with a torch in search of patta. They needed to walk deeper into the forest after a few days to collect tendu patta. The competition for the tendu patta collection is high traditionally. The village has a collection center. Villagers deposit their bundles daily by 5:00 pm at the collection center.

The average collection per household was 1,000 to 4,000 bundles. This year (2021) the rate for every 100 bundles was Rs. 227. So, through patta collection minimum income of the household was Rs. 2,270 and the maximum income was Rs. 9,080. The bonus is extra, according to the royalty fixed by the forest department.

Impact

To harvest tendu patta the villagers of Murpar walked 6 km from the village. They interrupt around 2,700 hectares of area in the forest while searching for the patta. As said by some villagers, sometimes they cut branches and whole trees to gather the leaves. The collection process is not sustainable and has a high impact on the regeneration of tendu trees. The cutting of trees for leaves collection resulted in no fruiting plants of tendu patta remaining in the area, said a veteran villager.

A household spends an average of 6 hours every day for 14 days collecting tendu patta in Murpar village. They searched around 6 km on average for tendu patta

MAHUA FLOWER COLLECTION

In the Bramhapuri forest division, the Mahua flower collection is on a large scale. Villagers traditionally selected Mahua trees for harvesting. These tresses were marked with cloths, plastic, or other sign for identification for the other collectors. One family claims 5 to 7 trees from the forests and gathers the flowers from the same trees traditionally. The villagers also collect Mahua flowers from their agricultural farms.

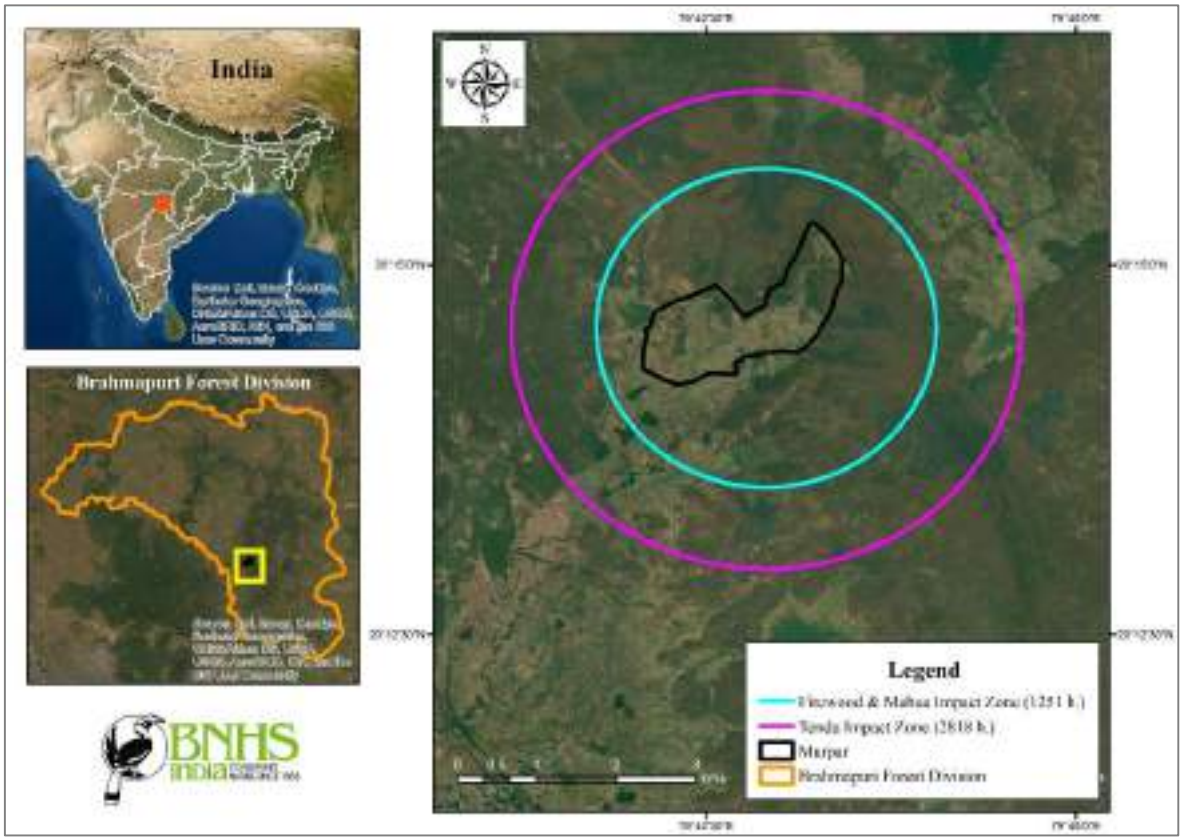
Collection Pattern

Out of surveyed 67 households, 56 households are involved in the flower collection. The participation of both men and women is equal in 48 households whereas in 4 households only women participate in the collection and in 2 households only men participate in the collection. On average, the Mahua flower harvester visit tree for more than 15 days and spends 6 hrs average daily collecting flowers. They collect 11 kg/day on average according to household data. For mahua collection, Murpar villagers cover around 4 km distance from the village.

The Mahua collection in Murpar village is unique in that each household has chosen mahua trees in the forest from which they have traditionally harvested Mahua. No one harvests from other's trees. Every household involved in the mahua collection follows this norm. Mahua collecting takes place in the early morning, between 5:30 and 6:00 am. Villagers know that the flowers fall from the trees at midnight, so they try to go to the trees early to gather more flowers. According to household data, 56 households were involved in the mahua flower collection this season. During the 22-to-25-day flowering season, a household earns anywhere between Rs. 3000-7000. The rate for dry mahua is between Rs. 38-40/kg. According to household data, a household collects 140 kg of wet mahua on average, which loses 60 to 70% of its weight when dried.

Impact

The villagers of Murpar moved in a range of 4 km from the village for flower collection. They impacted around 1,251 hectares of area in the forest. As the forest is also home to wild herbivores and there is no restriction on human activity in the forest, the Mahua flower collection has created competition between humans and herbivores. As mahua is also a vital food source for herbivores in the harsh summer season, the competition is creating food scarcity in the surrounding forest.



Map 1: The impact zone of Firewood, Mahua, and Tendu patta collection

In Murapar the collection of fuelwood is very high and it affects more than one thousand Ha around the village

CATTLE GRAZING

The village has three herdsmen, who are paid full-time. The team tied GPS to the cattle neck to follow cattle for three days in winter. To understand the grazing pattern of the village, our team tracked the movement of cattle for one day and discussed grazing patterns with the herdsman.

Grazing Pattern

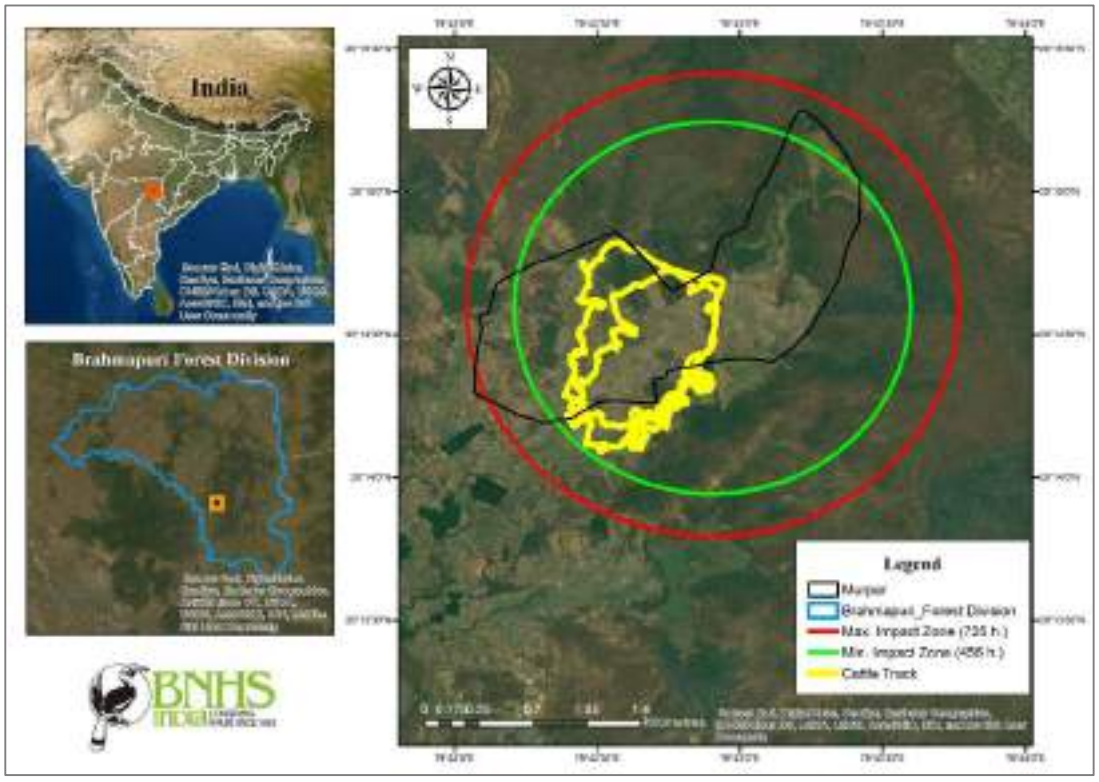
For three days, the team tracked cattle movement and activity using GPS. To find out more, our team spent a day following cattle and recording their activities. Herdsman was asked about his grazing patterns in the summer, winter, and monsoon. Cattle and a herdsman start their day at 11 am. every season. Cattle used to graze on barren land near the village in the summer and after the Paddy was harvested from the land in the winter. During the monsoon and the beginning of the winter, the cattle graze exclusively in the forest adjacent to the village. Throughout the season, the three herdsmen graze their cattle together. They travel around 4 km in the monsoon, which is the longest, and 1.5 km in the summer, which is the shortest. Grazing takes place exclusively in the forest from June to November. While grazing in the forest, the herdsman frequently encounters wild animals.

They travel around 4 km in the monsoon, which is the longest, and 1.5 km in the summer, which is the shortest

All cattle and goats graze in the agricultural area after the Paddy is cultivated. They feed on leftovers of Paddy and the vegetation that grows alongside the farmland. Every season, the cattle return to the settlement by 5 pm. There are no bells attached to the cattle in this village, which is unusual. When asked about the bells, the herdsman said that they were only attached to the cattle when they were grazing in the forest. The herdsman receives the amount of Rs. 150 for each cattle per month. There are 41 cattle owners in the village. 40 cows, 12 bulls, and 84 goats are among the village's livestock. Cattle ownership does not provide a direct financial benefit to the owner. However, having a buffalo in the village provides a direct benefit in the form of milk production. Owners, on the other hand, use dung in their agricultural fields. Each year 2 households sell cattle dung and on average earn Rs. 1,750 per year.

Impact

The grazing activity of Murpar village has a higher impact on the forest adjacent to the village. The cattle graze along a radius of 4 km from the settlement. Throughout the year nearly 146 cattle and goats from the village graze over a minimum of 456 and a maximum of 725-hectare area. The grazing activity creates competition between wild ungulates and cattle for fodder in the forested area as they were sharing space and food with the wild herbivores.



Map 2: Grazing zone in Murpar

Resource collection schedule of Murpar village

Resource	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Fuelwood	✓	✓	✓	✓	✓	✓	-	-	-	-	✓	✓
Small Timber	-	-	✓	✓	✓	-	-	-	-	-	-	-
Zadni	✓	-	-	-	-	-	-	-	-	-	-	✓
Grazing	-	-	-	-	-	✓	✓	✓	✓	✓	✓	-
Mahua flowers	-	-	-	✓	-	-	-	-	-	-	-	-
Tendu Patta	-	-	-	-	✓	-	-	-	-	-	-	-
Tendu Fruit (*Tembharu)*	-	-	-	-	-	-	-	-	-	-	-	-
Wild Vegetables	-	-	-	-	-	✓	✓	✓	✓	-	-	-






BNHS TEAM COLLECTING DATA FROM VARIOUS INTERVENTIONS

Garamsur Footprints

INTRODUCTION

The village Garamsur is located 600 meters from the core boundary of Bor Tiger Reserve. This village is deep inside the forest. However, from one end it is connected with the good road network in Nagpur district. Agriculture is the main occupation in this village. Agriculture labour is the second occupation. Cotton, Soybean, and various lentils are the main crops in this village. Many villagers commute daily to Karanja or Kondhali city for work. The village does not have a primary school. For schooling, villagers go to the Dhotiwada and Kondhali. The forest guard from the Karanja territorial range of the Wardha forest division as well as the forest guard of the new Bor range of Bor Tiger Reserve stays in the village. The micro plan of the village is prepared by the Bor Tiger Reserve.

The BNHS team conducted a household survey of 106 houses, which is nearly a 100% sample, to determine the villager's footprint and impact on the forest. In addition, to determine the villager's actual fuelwood demand, the team chose 10 households based on family size and economic situation and analysed their fuelwood usage for three consecutive days. The team also conducted an ocular estimation of small timber use with the same sample. The team used a GPS belt to monitor the cattle in the village to determine the grazing impact zone. The household survey was the main activity, during which the team collected quantitative data on livelihoods, the economy, resource harvesting, and human-wildlife interactions. In this village, there are very few families involved in the Mahua collection as the core area is very near. There is no collection center for Tendu leaves due to core area boundary restrictions.

FUELWOOD COLLECTION

In Garamsur village, fuelwood is the most reliant and used forest resource. Because every household in Garamsur uses Chulha for water heating and cooking. Every household in Garamsur collects fuelwood from the nearby forests.

Collection Pattern

Fuelwood collection follows a similar pattern throughout the village. Fuelwood collecting does not have a defined season in the village, however, the majority of it is done throughout the summer. During the summer, a total of 93 families collect fuelwood. But they harvest fuelwood in both the winter and the monsoon seasons as needed. The reason for the random collection is that the most utilized species for fuelwood is teak (*Saag)*, which, according to villagers, burns faster than other species. As a result, they enter the forest 21 to 30 times a year to collect fuelwood. In the village, 51 households have both men and women gathering fuelwood, with 29 households having just women and 17 households having primarily men harvesting fuelwood. Minors (under the age of 18) were also involved in the collection of fuelwood in 9 households.

According to the results of the household survey, 71 households bring fuelwood from the forest, while 35 households bring fuelwood from both the forest and agricultural land. People gather fuelwood from the agricultural land as the village contains roughly 233 acres of wasteland (agricultural land that has not been cultivated). The collection pattern in the village

differs from household to household depending on the household's economic situation. However, most of the villagers collect fuelwood in groups. 16 households collect fuelwood from the core region of tiger reserves, 86 households from the territorial forest exclusively, and 4 households from both the core and territorial forest. The most used species as fuelwood are Teak*, Dhawada,* and *Chilati.* Most households use fuelwood for the water heating and preparation of *Chapati* and *Bhakari.*

Fuelwood collection involves all households. According to the quantitative data, the forest department has provided LPG connections to 100 families whereas two houses have their own LPG connections. 1 household has gobar gas, whereas 3 households still do not have access to LPG and rely on chulha for preparing meals only. For 33 households, chulha remains an alternative source of meal preparation. However, chulha is primarily used for water heating in all 106 houses. Family size also plays an important role in fuelwood utilization. Even after receiving cylinders, they want to use them for extended periods by 100% heating water and preparing food to some extent on chulha.

People gather fuelwood from the agricultural land and 233 acres of wasteland

According to the data provided by the respondents, the village extracts 63 tons of fuelwood every year

Impact

Garamsur residents travel 1 to 6 kilometers to obtain fuelwood from the forest. In a year, one household collects 15 to 20 kg of fuelwood every day for 20 to 30 days. Garamsur residents travel an average of 3,768 hectares in their fuelwood harvesting zone. While collecting fuelwood, locals disturb this vast area. Around 100% of households participate in the collection process.

The team surveyed to calculate the village demand for fuelwood and annual fuelwood extraction by selecting 10 households based on family size and annual income. According to the data provided by the respondents, the village extracts 63 tons of fuelwood every year. However, the research found that the Garamsur villagers use 95 tons of fuelwood per year. 100 households have LPG, but the amount of fuelwood collected has not reduced significantly as all the households utilize fuelwood for heating water and cooking. Fuelwood collection significantly disturbs the surrounding wildlife habitat of the village.

Maximum households have LPG, but the amount of fuelwood collected has not reduced significantly as all the households utilize fuelwood for heating water and cooking

SMALL TIMBER COLLECTION

Cow shelters and agricultural fencing are the most common uses of small timber. In Garamsur, the majority of households have a timber fence around their houses.

Collection Pattern

The collection is generally done by one person, although it can also be done in a small group. The small timber is collected at random as it is needed, i.e., when people want to replace the timber. So, it's difficult to say which season is preferable, but if small timber is needed for agricultural purposes, it's usually collected in the summer.

According to the results from the household survey, 80 of the 106 surveyed households obtain small timber from the forest. 17 households frequently collect it from the core area of the tiger reserve whereas 63 households collect it from the territorial forest. Most of the small timber harvesting is done with cycles and headload. Villagers go to the forest 3-4 times a year on average to harvest small timber and it takes an average of 3 hours for the collection. Men are mostly involved in the collection. The most preferred species as small timber is Teak.

According to household data, 80 households collect small timber actively. Of the 106 households, all the households utilize it for home construction, whereas 15 households use it to make agricultural tools, 15 households use it for cattle shade, 14 households utilize it for a watchtower and 7 households utilize the small timber in fencing of the farm.

Impact

According to the study, villagers invaded an average of 3.69 km and impacted 2,800 hectares in the surrounding forest to collect small timber. However, the collection is not frequent or consistent, but it does occur in a certain amount and during a specific period.

Most of the small timber harvesting is done with cycles and headload. Villagers go to the forest 3-4 times a year on average to harvest small timber and it takes an average of 3 hours for the collection

CATTLE GRAZING

Throughout the year, all cattle in the Garamsur village graze in the forest and on some barren land. The village has one fully paid herdsman. The team used GPS to follow cattle for three days and observed their activity for one day accompanying herdsmen.

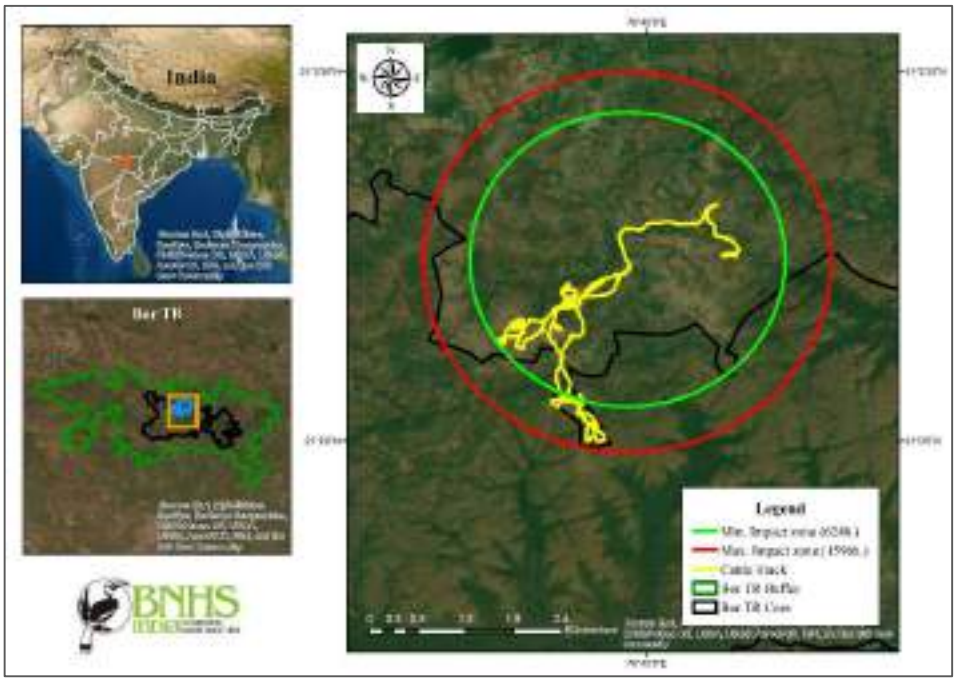
Grazing Pattern

The team used GPS to follow cattle movement and activity for three days in September, during the monsoon season. To learn more, our team followed cattle for a whole day in the forest, recording their activities.

There are 82 cattle-owning households in the Garamsur village. 163 cows, 17 buffalos, 41 bulls, and 108 goats are among the village's livestock

In this study, it is seen that cattle began heading towards a grazing area surrounding the village at 10:30 am., followed by a herdsman. The cattle travelled slowly towards the grazing area, as they used to get vegetation off the wayside during the monsoon. After an hour, the

cattle entered the territorial forest to graze. A stick, an axe, a water bottle, and a tiffin are carried by the herdsman. Cattle began eating grass after entering the forest. According to the herdsman, cattle have a variety of options for feeding during the monsoon. Cattle were seen feeding largely on grass and occasionally on the leaves of specific trees such as *Rohan, Dhawada,* and others. Cattle began grazing in one location after entering the dense forest. The herdsman relaxes and sits on the ground once the cattle had gathered on a site.



Cattle grazing tracks

After feeding on the site, the herdsman resumes action at 3:30 pm., rounding up cattle and returning to the village. Cattle began to return to the village while continuing to feed along the route.

When inquired about the bells attached to certain cattle, the herdsman explained that they are intended to keep an eye on the cattle when they approach the deep forest. Some cattle usually go forward in the herd, while others always move back, hence these cattle are mostly bell-tied to keep an eye on the herd when visibility is limited. The 113 cattle are under the daily responsibility of the herdsman, who receives Rs. 100 per cattle per month. Cows and calves, with the occasional bulls, make up the majority of the herd. The bull generally grazed on the land held by the owners. The charges are low for the calves. Another person who owns a cow and buffalo and is in the milk production business gets their cattle on their own to graze on the barren ground near the core boundaries of the tiger reserve.

There are 82 cattle-owning households in the village. 163 cows, 17 buffalos, 41 bulls, and 108 goats are among the village's livestock. 55 households' livestock is grazed by the herdsman, whereas the rest graze their cattle on their own. Cattle ownership does not provide a direct financial benefit to the owner; having a buffalo in the village provides a direct benefit in the form of milk production. Owners, on the other hand, use dung in their agricultural fields. 23 households sell the manure to other farmers in their village and adjoining villages, bringing in an average of Rs. 2,300 each year.

Impact

The grazing activity of Garamsur village has a higher impact on the forest adjacent to the tiger reserve core. The cattle graze along a radius of 4 km from the settlement. Throughout the year 180 cattle from the village graze over a minimum of the 624-hectare area and a maximum of 1,596-hectare area. The grazing activity creates competition between wild ungulates and cattle for fodder in a forested area.

The herdsman relaxes and sits on the ground once the cattle had gathered on a specific grazing site

WILD VEGETABLE COLLECTION

The team had a group discussion with women's Self-Help Groups (SHGs) to assess and analyse the topic of wild vegetable harvesting. During the conversation, the team learned that villagers consume 6 different varieties of wild vegetables traditionally.

Collection Pattern

According to the residents of Garamsur village, they do not spend as much time harvesting wild vegetables as they do harvesting other resources. The majority of the time, the collection is both opportunistic and deliberate. Wild vegetables are found in the specific area in the forest and barren land near the village. 36 households pick wild vegetables from the forest and forest edges, according to data from a household survey and all of the households harvest wild vegetables for self-consumption. Villagers eat wild vegetables with taste as they get them only for a few days.

Impact

According to discussions with women self-help groups, Garamsur villagers travel an average of 1-2 km distance in the forest and on the agriculture bunds to harvest wild vegetables. The impact is an average of 1,200 hectares each season to harvest wild vegetables. This is a seasonal collection; therefore, the frequency of visits is lower than for other resources.

Year-wise resource collection schedule of Garamsur village

Resource	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fuelwood	✓	✓	✓	✓	✓	✓	-	-	-	-	✓	✓
Small Timber	-	-	✓	✓	✓	-	-	-	-	-	-	-
Grazing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mahua	-	-	-	✓	-	-	-	-	-	-	-	-
Tendu Patta	-	-	-	-	-	-	-	-	-	-	-	-
Tendu Fruit (*Tembharu)*	-	-	-	-	-	-	-	-	-	-	-	-
Wild Vegetables	-	-	-	-	-	✓	✓	✓	✓	-	-	-

To address the human-wildlife interface, the tiger project provided toilets to the villages through the SPM scheme

Ghatkukada Footprints

INTRODUCTION

The Ghatkukada is located on the border of Madhya Pradesh in the West Pench range of the Pench Tiger Reserve of Nagpur district. This is a small village in which 41 families reside. The village has nearly 95% population of tribals and 5% of the Gawali community. The main occupation is agriculture and the secondary occupation is labor work. The Gawali community mostly relies on the milk production business. The main crops of the village are Paddy, Cotton, Jowar, Corn, lentils, etc. The village does not have a primary school. For schooling, students go to the Dhawalpar and Khapa villages. The forest beat Guard of West Pench range stays in the village. The micro plan of the village is prepared by the Pench Tiger Reserve.

In the household survey, the team collected quantitative and qualitative data on villagers' livelihoods, resource collection, and human-wildlife conflict. In the survey, it is noticed that villagers prefer to collect Tendu patta more than the Mahua flowers. The team collected a 100% sample, to determine the village's footprint and impact on the forest. In addition, to determine the village's actual fuelwood demand, the team selected 10 households considering the family size and economic situation of the families. The team analysed their fuelwood usage for three consecutive days.

FUELWOOD COLLECTION

In Ghatkukada village also, fuelwood is the most reliant forest resource as every household in Ghatkukada uses chulha for heating water and also cooking purposes.

Collection Pattern

Most of the fuelwood collection is done throughout the summer. During the summer, a total of 27 households collect fuelwood whereas 14 households collect fuelwood in both the summer and winter seasons. Because the village is surrounded by forests, the dependency on fuelwood is greater, as they can obtain fuelwood at any time.

In 32 households, both men and women gather fuelwood, with 4 households having just women and 5 households having primarily men collecting fuelwood. According to the household survey, 35 households bring fuelwood from the forest, while 6 households bring fuelwood from both the forest and agricultural fields. The village also has barren land nearby the forest where fuelwood collection regularly happened. The collection pattern in the village differs from household to household as per the economic condition. However, most of the locals collect fuelwood in groups. 6 households collect fuelwood from the core area of tiger reserves which is very near to the village. 20 households collect from the buffer forest exclusively, and 15 households from both the core and buffer forest. The most used species as fuelwood are Teak, *Dhawada, Khair,* and *Ghogal.* Most of the households use fuelwood for the heating water and preparation of *Chapati* and sometimes Rice. To save money on LPG cylinders, they usually prepare a one-time complete meal on chulha during the winter season.

The forest department has provided LPG connections to 39 households. But, only 13 households prepare meal solely on LPG, whereas 20 households use LPG and chulha simultaneously. 2 household has gobar gas as they use both LPG and gobar gas simultaneously, whereas 3 households still do not have LPG and rely on chulha for preparing meals. However, chulha is primarily used for water heating in all houses.

Impact

Ghatkukada residents travel 1 to 3 kilometers to obtain fuelwood from the forest. A single household collects 21 to 30 kg of fuelwood every day. For yearly stock, the family visits the forest for 10 to 20 days. Residents walk an average of 700-800 hectares in their fuelwood harvesting zone. Around 100% of households collect fuelwood, which destroys forests and habitats.

The team conducted annual fuelwood extraction by selecting 10 households based on family size and annual income. According to the details provided by the respondents, the village extracts 22 tons of fuelwood every year. However, the BNHS team found that the villagers use 47 tons of fuelwood per year. Though 39 households have LPG, the amount of fuelwood collected has not decreased significantly fuelwood is the only option for hot water.

Though 39 households have LPG in houses, the amount of fuelwood collected has not decreased significantly as fuelwood is the only option for hot water

SMALL TIMBER COLLECTION

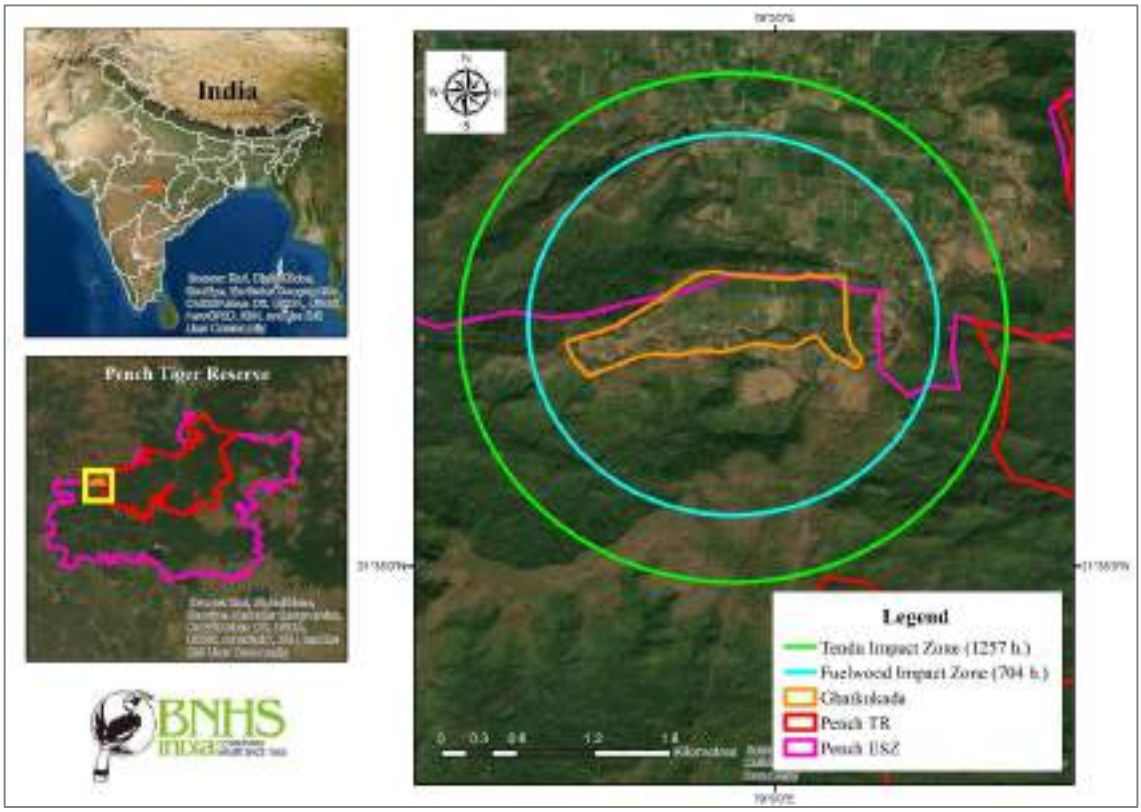
Small timber is primarily used in Ghatkukada for household construction and agricultural purposes. As needed, the timber is replaced in 1 to 3 years, however, for house construction, it is used every 10–15 years on average. The corn requires constant monitoring due to crop raids by wild animals. The wooden machan (*Mara*) is commonly seen in the agriculture field for crop protection.

Collection Pattern

The timber is collected at random as it is needed. Small timber needed for agricultural purposes, is usually collected in the summer. According to the results from the household survey, 29 of the 41 surveyed households obtain small timber from the forest regularly. 3 households frequently collect it from the core area of the tiger reserve, whereas 26 households collect it from both core and buffer forests. Most of the timber harvested is carried on cycles.

Villagers go to the forest for a week a year on average to harvest small timber and it takes an average of 4 hours for the collection. Men are mostly involved in small timber collection in 22 households whereas women also participate in the collection from 7 households. The most preferred species as the small timbers are Teak and *Garadi*. According to household data, 29 households collect small timber actively. Of the 29 households, 27 households use it for home construction, whereas 24 households make agricultural appliances, 14 households make cow shelters, 17 households utilize it for a watchtower and 26 households utilize the small timber in *Mandav or* mara

The villagers of Ghatkukada stroll in a range of 3.27 km from the village to collect small timber. They impacted 700 hectares of area in the forest



Ffuelwood and tendu patta collection impact in Ghatkukada village

CATTLE GRAZING

There are 167 cattle in the village of which 39 cows, 44 bulls, 14 buffalo, and 30 are goats. The village does not have a herdsman. A few years back, one person from Susurdoh, Madhya Pradesh worked as a herdsman for the village. However, he died three years ago. As a result, the cattle have no herdsman now.

Many people choose stall feeding in places near their farms and in their cowsheds. One family of the Gawali community grazes his cattle in the forest in the monsoon. The person has a milk production business in the village and sells milk to nearby villages. He prefers to graze on barren land and on his farm in the winter and summer. This feeding pattern for cattle heavily relies on the corn crop. The crop leftover was largely used to feed livestock in their stalls. As a result, the community has minimal impact on the forest through grazing, however, livestock does graze in the forest during the monsoon season as per our observation.

The feeding pattern for cattle heavily relies on the corn crop. The crop leftover was largely used to feed livestock in their stalls

TENDU PATTA COLLECTION

In this village, the forest department closed the tendu patta collection center as the village is only a thousand meters from the core boundary of the tiger reserve. The collection center, however, reopened this year at the request of the villagers. Tendu patta provides enough money to the people during the hot summer months when there is no other accessible labor activity in the area. As a result, tendu patta collection has resumed in Ghatkukada village this year.

Collection Pattern

The tendu patta collection involved 33 households, according to household surveys. Six households entered the core for the collection, 12 households visited the buffer area for patta, and 15 households gathered from both the core and the buffer. A household spends an average of 16 days collecting tendu patta. They searched about 6 km region for tendu patta.

On average, in the season, each household spends 5-6 hours every day collecting patta. According to our data gathered, in 28 houses, men and women were equally active in the collection process, with three households having only men involved in the collection process and two households having only women participating in the collection process. A family collected around 200 bundles of average patta per day. When asked more specifically about the collection process, some households stated that they began going toward the forest from 5:30 to 6:00 am. This year 33 households participated in the collection of tendu patta. The remaining 9 households were busy in labor work in Madhya Pradesh during the tendu patta season. The average collection per household was 1000 to 3000 bundles. The rate for every 100 bundles was Rs. 227. So, through patta collection minimum income of the household was Rs. 2,270/- and the maximum income was Rs. 6,810/- according to the size of the family.

Impact

To harvest tendu patta the villagers of Ghatkukada traveled around 5 to 6 km from the village. They impacted around 2,700 hectares of area in the forest while searching for the patta. As said by some villagers, sometimes the branches and trees are cut to get patta. The collection process is not at all sustainable and has a high impact on the regeneration of tendu trees.
The Ghatkukada villagers collected MFP in very small numbers. They rely on the Chandrikapur, and Dahnapur villages from Madhya Pradesh for livelihood. They sell their agri products in these villages as these villages are very near to them. The Ghatkukada village is very small having only 41 households. So, there is no competition for forest resources. But the villagers from the MP side illegally enter the forest nearby Ghatkukada and are involved in poaching and other illicit activities which impact the forest near this village.

Resource Collection Schedule of Ghatkukada

Resource	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Fuelwood	✓	✓	✓	✓	✓	✓	-	-	-	-	✓	✓
Small Timber	-	-	✓	✓	✓	-	-	-	-	-	-	-
Grazing	-	-	-	-	-	-	✓	✓	✓	-	-	-
Mahua flowers	-	-	-	-	-	-	-	-	-	-	-	-
Tendu Patta	-	-	-	-	✓	-	-	-	-	-	-	-
Tendu Fruit (*Tembharu)*	-	-	-	-	-	-	-	-	-	-	-	-
Wild Vegetables	-	-	-	-	-	✓	✓	✓	✓	-	-	-

The village has a good forest of Pench Tiger Reserve, but many people from the MP side ventured into the forests for illicit activities

Umarzari Footprints

INTRODUCTION

Umarzari is located on the core boundary of the Navegaon-Nagzira Tiger Reserve. This is one of the gates of the core area of the New Nagzira sanctuary. This village is well connected to the road network. Agriculture is the main occupation in this village. Paddy and sugarcane are the main crops and landless villagers depend on other daily wages to work in nearby villages. There are 109 families. The BNHS team conducted a household survey of 72 selected houses to determine the village's footprints and impact on the forest. The team is unable to survey 100% of households' survey in the village since many residents are out of the village for livelihood. Some villagers have negative perceptions of wildlife, forests, and individuals who work for them, the Umarzari people did not cooperate with our survey work. Even though Umarzari has a tiger reserve tourism gate, the residents of Umarzari have a poor relationship with the forest department. Of all these factors, studying became more difficult for the team on the field.

The village has a primary school. For higher schooling students go to the Ekodi, Lakhani, and Sakoli. The forest guard is not a resident of the village. The village has an eco-tourism complex. The micro plan of the village is prepared by the Navegaon-Nagzira tiger reserve.

In this village for the fuelwood collection system, the team selected 10 households based on family size and economic situation. The team also conducted an ocular estimation of small timber use with the same sample. The team used a GPS belt to monitor the cattle in the village to determine the grazing impact zone in summer, monsoon, and winter as a case study. The team was able to perform a three-day case study on the Tendu patta collection and collect detailed information about the collection pattern in the summer months.

Due to the proximity of the tiger reserve, villagers face crop damage frequently

FUELWOOD COLLECTION

In Umarzari village, fuelwood is the most dependent and used forest resource. Every household in Umarzari uses Chulha for heating water, and cooking. Each house collected fuelwood from the nearby forests, buffer as well as the core. They are very close to the core so they mostly venture into the core forest for fuelwood as well as other resources.

Collection Pattern

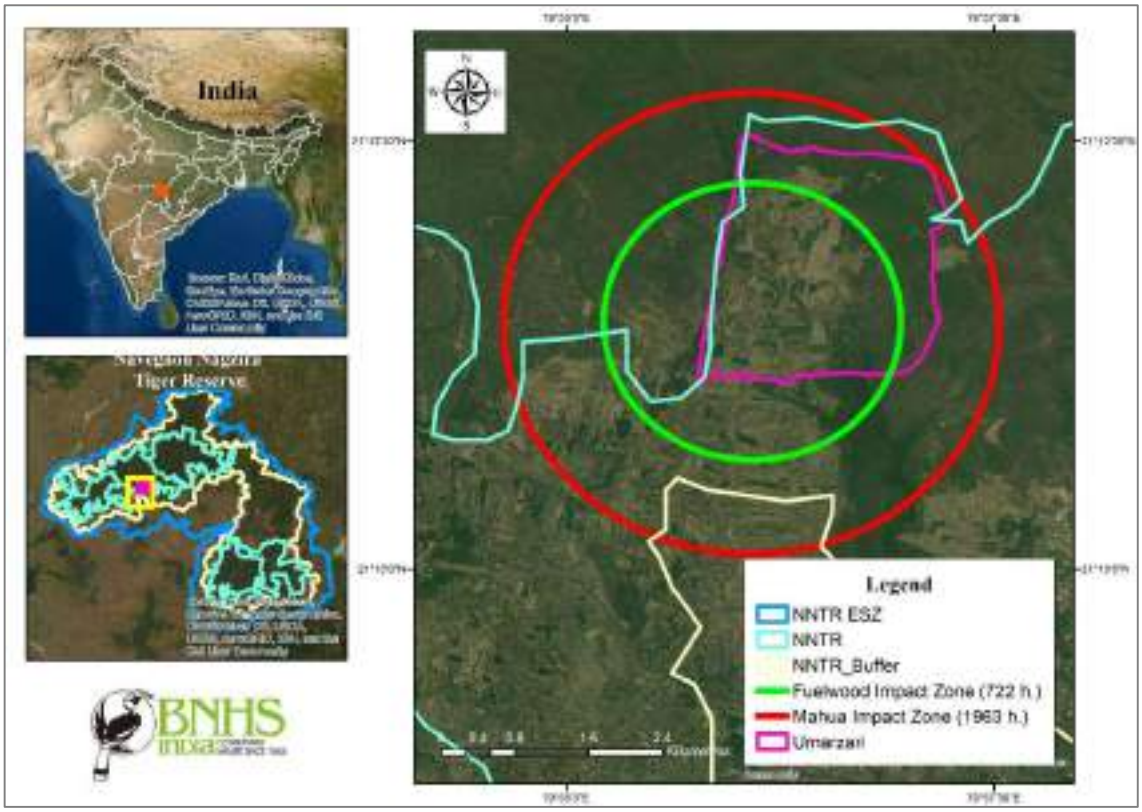
Fuelwood is mostly collected during summer as the people are busy with agricultural work till April. During the summer, a total of 68 families collect fuelwood whereas 4 families collect fuelwood in winter simultaneously. After all the collection takes place in any season by an individual if needed. In the village, 23 households have both men and women gathering fuelwood, with 17 households having just women and 32 households having only men harvesting fuelwood. Compared to Garamsur and Karwa the percentage of men harvesting fuelwood is higher in Umarzari. According to the results of the household survey, 51 households bring fuelwood from the forest, while 21 households bring fuelwood from both the forest and agricultural land. 28 households collect fuelwood from the core region of the tiger reserve, 38 households from the territorial forest exclusively, and 6 households from both the core and territorial forest. The most used species as fuelwood are *Sag, Aien,* and other species. The majority of homes utilize fuelwood for water heating and rice cooking. Because most women employed in agriculture work for up to ten months, the use of Chulha for meal preparation is a random process.

The Umarzari crop pattern is important here, the major crops are sugarcane and paddy. As a result, compared to other villages, the residents engage in agriculture for a longer period. Also, because many of the residents are away from the village for up to two months at a time, the time spent utilizing Chulha is gradually reduced. According to the quantitative data, the forest department has provided LPG

connections to 72 families. One household has gobar gas, whereas 7 households still do not have access to LPG and rely on Chulha for preparing meals. 4 families started using Chulha because of the hike in the LPG price recently. For all 72 households, Chulha remains an alternative source of meal preparation. However, this is primarily used for heating water in all houses. Fuelwood collection does not include a direct economy. Family size also plays an important role in fuelwood utilization. Even after receiving cylinders, they want to use them for extended periods by heating water with fuelwood.

Impact

Umarzari residents travel 1 to 4 kilometers to obtain fuelwood from the forest. One household collects 15 to 25 kg of fuelwood every day for 11 to 20 days. Residents walk an average of 2500 hectares in their fuelwood harvesting zone. Around 100% of households participate in the collection process, which is why fuelwood collection has a greater influence on the forest than any other resource. The experiment was conducted in Umarzari too to calculate the village's fuelwood demand and annual fuelwood extraction by selecting 10 households based on family size and annual income. As the team was unable to conduct a 100% household survey, the team could not calculate the village's annual fuelwood demand from quantitative data. However, our study found that the villagers use an average of 65.86 tons of fuelwood per year.



Umarzari village showing fuelwood, Mahua impact zones

SMALL TIMBER COLLECTION

In this village, there are most cement houses, the locals do not collect small timber regularly. However, the previously harvested small timber is still available in their homes, cow shelters, and *Mandav*. However, the team is unable to estimate small timber harvest using quantitative data because only four respondents stated that they gather small timber frequently. But with the ocular estimation experiment, the team was able to calculate the small timber collection in the village.

Collection Pattern

According to the four respondents, small timber is primarily collected from the core and territorial forests for harvesting the required small timber. The small timber is harvested on average four times per year. In the case of Umarzari, only men harvest small timber. Three of the four respondents were using small timber for domestic purposes, with one household using it for the *Mandav*. The team also observed that some farmers used wooden fences but were unable to collect this information in the survey. The team calculated that four out of ten houses have *Mandav* in front of their homes based on our ocular estimates of ten households. *Dhawada* and *Garadi* are the most common *Mandav* species. Garadi is also the most utilized species in typical houses, and teak is used for polls. For the floor of *Mandav* bamboo is purely used in all households. Most people constructed cement households in recent times, so they removed small timber from these houses and now utilized it as the fuelwood for chulha and bonfires. According to household data, 4 households collect small timber actively. Due to the government schemes most of the families got the cement households on subsidy, due to this, the small timber collection decreased gradually.

Impact

According to a household study, Umarzari villagers stroll an average of 3.25 km to collect small timber. In this scenario, on average villagers walk around 3000 hectares in the surrounding forest for small timber collection. However, the collection is not frequent or consistent and the active households in the collection are lesser, but it does occur in a certain amount and during a specific period.

CATTLE GRAZING

Throughout the year, all cattle in the Umarzari village graze in the forest. The village has two herdsmen, who are paid full-time. To acquire a better understanding of grazing patterns, the team used GPS to follow cattle for five days in summer, monsoon, and, winter as a study. To understand the grazing pattern of the village, the team observed the cattle for three days during each season. Sugarcane is the main crop in the village, which is why the herdsman stays with cattle throughout the year.

(Detailed cattle grazing study has mentioned in the grazing case study report separately)

Mahua flower Collection

In Gondia and Bhandara districts the collection of mahua flowers is commonly seen in forested villages. The collection is the highest followed by Chandrapur district.

Collection Pattern

Out of surveyed 72 households, 39 households are involved in the mahua flower collection. 33 households collect flowers from the forest and 6 households collect it from agricultural land and forest both. 2 households collect flowers from the core only, whereas 37 households collect from both the core and territorial forest. The participation of both men and women is equal in 27 households whereas, in 6 families, only women participate in the collection, and in 5 families, only men participate in the collection. On average, the flower harvester visit tree for 14 days to collect flowers 5.5 kg/day according to household data. According to household survey data, 39 households were involved in the mahua flower collection this season. During the 25-day flowering season, a family earns between Rs. 3000 and 5000. The rate for dry mahua is between Rs. 38-40 per kilogram. According to household data, a household collects 76 kg of wet mahua, which loses 60 to 70 % of its weight when dried.

Impact

The collection of mahua flowers is taken place along a radius of 2.5 km from the village. Throughout the year nearly 100-110 people from the village stroll over the 1960 hectares area which causes high disturbance over the core and adjacent area of the tiger reserve. Also, the over-extraction of flowers creates food scarcity for wild ungulates in harsh summers.

TENDU PATTA COLLECTION

Tendu patta is a major source of income for villages on the outskirts of the Navegaon-Nagzira Tiger Reserve. The tendu patta collection center is in Umarzari village, where locals from Umarzari, Bampewada, and Aategaon bring tendu patta bundles in season. A case study was undertaken by a member of our team from the Umarzari village to better understand the dependency. To learn more about the tendu patta collection pattern, the team followed them for three days in the forests.

(This study was depicted in the tendu patta collection report separately)

Wild Vegetable collection

The team had a meeting with SHG women to understand the consumption and harvesting of wild vegetables. During the conversation, the team learned that the people consume 9 different varieties of wild vegetables.

Collection Pattern

Most of the time, the collection is both opportunistic and deliberate. Wild vegetables are found in the specific area in the forest and barren land near the village. They travel around 1-2 km of the area surrounding the village to gather wild vegetables. 18 households pick wild vegetables from the forest and forest edges, according to data from a household survey and all the households harvest wild vegetables for self-consumption.

Impact

According to a discussion with women, Umarzari villagers travel an average of 1-2 km distance in the forest to harvest wild vegetables. They violate an average of 1000 hectares each season to harvest wild vegetables. This is a seasonal collection; therefore, the frequency of visits is lower than for other resources.

Resource Collection Schedule of Umarzari

Resource	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Fuelwood	✓	✓	✓	✓	✓	✓	-	-	-	-	✓	✓
Small Timber	-	-	✓	✓	✓	-	-	-	-	-	-	-
Grazing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mahua flowers	-	-	-	✓	-	-	-	-	-	-	-	-
Tendu Patta	-	-	-	-	✓	-	-	-	-	-	-	-
Tendu Fruit (*Tembharu)*	-	-	-	-	-	-	-	-	-	-	-	-
Wild Vegetables	-	-	-	-	-	✓	✓	✓	✓	-	-	-

Pahungaon Footprints

INTRODUCTION

The Pahungaon is located inside the Paoni Range of the Umred-Paoni-Karhandla (UPK) Wildlife Sanctuary. Agriculture is the main source of income in this village. The BNHS team also found milk production as a secondary occupation in this village. Few families are involved in fishing. Paddy and Chana are the main crops. The village is located within the core limit of the wildlife sanctuary and has a significant resource impact on the area due to its resource collection footprints. The village is connected to Paoni town with a good road network. The village has a primary school. For higher schooling, the students go to Paoni. The forest guard does not stay in the village. The micro plan of the village is prepared by the UPK sanctuary and as per the villagers the village is in a state of relocation.

The team did a household survey of 110 houses, which is a 100% sample, to determine the footprint and impact of the village on the forest. The team also used a GPS belt to monitor the cattle in the village to determine the grazing impact zone. The household survey was the main activity, during which the team collected quantitative and qualitative data through group discussions with various stakeholders.

FUELWOOD COLLECTION

Collection Pattern

Being deep inside the forest, the villagers have easy access to the fuelwood. The pattern of fuelwood collection does not vary significantly from one household to another. Many locals collect fuelwood in groups; however, others bring it alone or with 1-2 other people if necessary. During the summer, a total of 65 households collect fuelwood and 45 households harvest fuelwood in both the winter and summer seasons. In the village, 50 households have both men and women gathering fuelwood, with 25 households having just women and 35 households having primarily men harvesting fuelwood. According to the results of the household survey, 74 households bring fuelwood from the forest, while 36 households bring fuelwood from both the forest and agricultural land.

To collect fuelwood, 85 households, select the method of headload which is widely used to collect fuelwood, especially by women. 8 households use cycles to collect fuelwood, whereas 16 households use bullock carts to collect fuelwood. The ratio of bullock cart users in this village is much higher than in other villages and landscapes. The most used species as fuelwood are Teak*, Dhawada,* and *Palas.* Most households use fuelwood for heating water

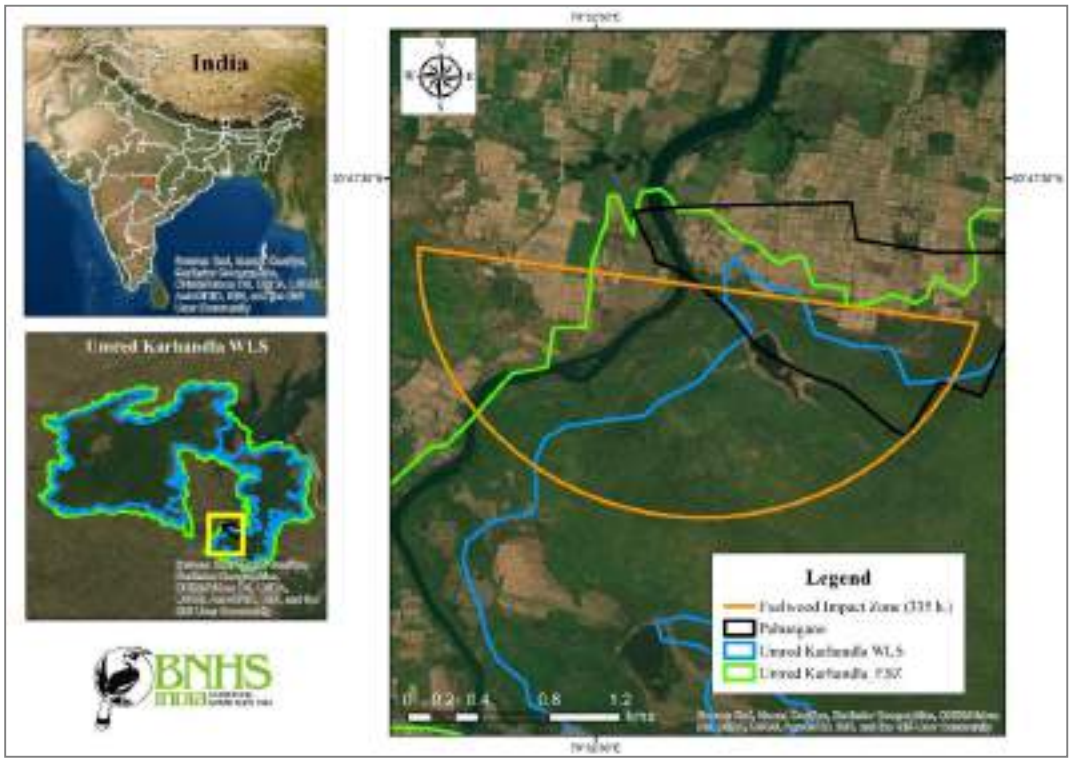
and preparation of meals. In addition to fuelwood using frequency, 95 households get their LPG at doorsteps, whereas 13 households need to reach tehsil place Paoni to refill their LPG.

The availability of LPG at doorsteps plays an important role in controlling the frequency of fuelwood usage. But in the case of Pahungaon, people rely more on fuelwood as they get more easy and free access to these resources. According to the quantitative data, the forest department has provided LPG connections to 108 households. Whereas 2 households still do not have access to LPG and rely on Chulha for preparing meals. 48 households purely use LPG for meal preparation. For 60 households, Chulha is used simultaneously for meal preparation. However, Chulha is primarily used for heating water in all 110 houses.

Impact

Pahungaon residents travel 2 to 3 kilometers to obtain fuelwood from the forest. In a year, one household collects 21 to 30 kg of fuelwood every day. In a year, one family visits the forest for 21 to 30 days for the collection of fuelwood. The residents travel an average of 700 hectares for fuelwood harvesting in the area of the sanctuary. While collecting fuelwood, locals disturb this vast area. Around 100% of households participate in the collection process, which is why fuelwood collection has a great influence on the forest.

Our study found that the villagers use 108 tons of fuelwood per year. Though 108 households have LPG, the amount of fuelwood collected has not decreased significantly as all the households utilize fuelwood for heating water and simultaneously for meal preparation. Fuelwood collection significantly disturbs the surrounding critical wildlife habitat.



Fuelwood impact zone

SMALL TIMBER COLLECTION

The amount of small timber utilization per household is comparatively higher compared to other villages the team studied in footprints. As they have ample resources available at their doorsteps. Farmers which grow rabi crops in their lands, each year construct new watchtowers to do night patrolling for the protection of crops. The small timber is replaced in between one to two years for watchtowers if required. Many agricultural types of equipment were made by these woods, observed in the village.

Collection Pattern

The timber collection follows a similar approach. The collection is generally done by one person, although it can also be done in a small group. It is usually collected in the summer. But, for watchtowers, the collection is done between November and December to meet the necessity of time. According to the results from the household survey, 39 of the 110 surveyed households obtain small timber from the forest actively. Most of the small timber harvesting is done with cycles. Villagers go to the forest 3 times a year on average to harvest small timber and it takes an average of 3.5 hours for the collection. In 33 households, men are involved in small timber collection. And in 6 households, men and women are equally involved in the collection. The most preferred species as the small timbers are Teak and *Dhawada*. Some villagers do fishing in the river backside of the village. They use *Bherra* species timber for the construction of small boats.

For the households and cow shelter construction, they mostly prefer “Y” shape timber to be used as the pillars of the structure. According to household data, 39 households collect small timber actively. But in case all the households were involved in the timber collection at a particular time. Out of 39 households, all the households utilize it for home construction, whereas 18 households use it to make agricultural appliances, 13 households use it for cow shelters, 25 households utilize it for a watchtower and 11 households utilize the small timber in fencing of the farm. 22 households utilize small timber for *Mandav* in front of their homes.

Impact

According to a household study, villagers walk an average of 2 km to collect small timber. In this scenario, on average villagers walk around 330-400 hectares in the surrounding forest for small timber collection. However, the collection is not frequent or consistent, but it does occur in a specific period. In the case of Pahungaon, it is more impactful as all the harvesting is done in critical tiger habitats.

Villagers do fishing in the river backside of the village. They use Bherra species for the construction of small boats

CATTLE GRAZING

Throughout the year, all cattle in the village graze in the forest, and in summer only on some barren terrain. The village has no herdsman. The cattle owners graze their cattle on their own. To acquire a better understanding of the grazing patterns of the village, the team used GPS to follow three cattle groups for three days. The village also has an ample number of Sheep owned by the *Dhangar* community. The sheep also graze in the forest with cattle.

Grazing Pattern

In October, the team tied GPS to track cattle movement and activity for three days. To learn more about the grazing pattern, the team also spoke with the cattle owners to have a better understanding of their habits. At 11:30 am, cattle began moving towards a grazing area outside the village, followed by the owner. There are 14 cows and 11 buffalos in the first group. The second group consists of 11 cows and 12 buffalo, while the third group consists of 12 cows and a herd of sheep. Cattle owners generally graze their cattle in the forest, which is critical tiger habitat. They graze along the riverbank and on some barren terrain occasionally. Grazing is typically done in the same direction by groups one and two. The third group, which includes sheep, grazes primarily near water bodies in the forest. Because the owners are not expert herdsmen, they are doing sheep rearing traditionally. When they are at risk of being attacked, which is primarily during the summer, they graze all their cattle around the village and try to avoid being attacked. In the summer, they usually travel up to 2 km from the village. However, due to the crop pattern, they prefer to graze in the forest and along the riverbank during the monsoon and winter seasons. The households having less than 10 cattle tide their cattle near the farm for grazing and in summer mostly do stall feeding. There are 64 cattle owners in the village. There are 22 bulls, 37 cows, 32 buffalo, and 483 sheep and goats in the village.

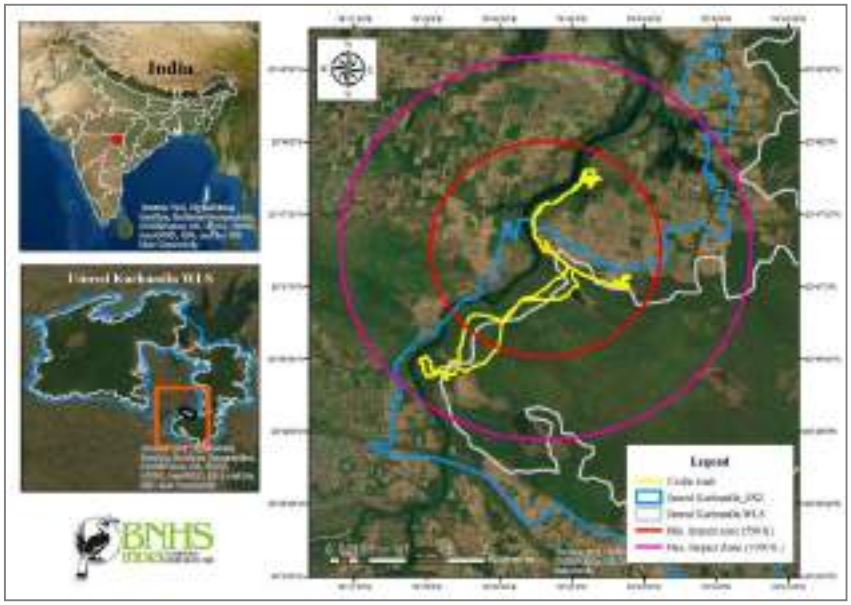
Cattle ownership does not provide a direct financial benefit to the owner. However, having a buffalo in the village provides a direct benefit in the form of milk production. Owners, on the other hand, use dung in their agricultural fields. 7 households sell the manure to other farmers in their village and adjoining villages, bringing in an average of Rs. 2500 each year.

The sheep owners are of the Dhangar community and sheep rearing is their traditional business. The meat market is in Paoni town and the Pahungaon village itself.

Impact

The Pahungaon cattle graze in the forest, which is crucial tiger habitat, for a minimum of 590 hectares and a maximum of 1,900 hectares. A herd of about 60 cattle tramples a vast area of forest. Furthermore, approximately 400 goats and sheep graze in the same impact zone throughout the year. Sheep have a higher density than cattle, resulting in more plant degradation and a negative impact on tiger habitat regeneration.

When asked about the mahua flower and tendu patta collection, the villagers do not collect tendu Patta and mahua flowers as the protected area is near. But the BNHS team came to know that very few villagers stealthily collect these forest produces.



Cattle track and impact zone

Resource Collection Schedule of Pahungaon

Resource	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Fuelwood	✓	✓	✓	✓	✓	✓	-	-	-	-	✓	✓
Small Timber	-	-	✓	✓	✓	-	-	-	-	-	✓	✓
Grazing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mahua	-	-	-	-	-	-	-	-	-	-	-	-
Tendu Patta	-	-	-	-	-	-	-	-	-	-	-	-
Tendu Fruit (*Tembharu)*	-	-	-	-	-	-	-	-	-	-	-	-
Wild Vegetables	-	-	-	-	-	✓	✓	✓	✓	-	-	-

BNHS