

Wildlife and Human Dependence on Mahua Flowers

Camera trap study in Tadoba Landscape



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



EXECUTIVE SUMMARY

In all the important forest produce, tendu leaves (patta) are the leading money-making business in the dry forests of Central India. Due to the huge economy in this collection, there is competition among the villagers. Villagers venture early morning for collection. When collecting these leaves, they are not afraid of wild animals.

BNHS collected data from the forest department and revealed that in Nagpur Forest Circle, 80,552 families were involved in 2019 in tendu patta collection. The circle comprises Nagpur, Wardha, Bhandara, and Gondia, forest divisions. In this circle, Gondia has the highest number of collection centers as well as Community Forest Right (CFR) units. In this division, in 2019, 31,887 families collected tendu patta. This is the highest number of families involved in the patta collection after Gadchiroli. Bhandara comes after Gondia. In Bhandara, 27,346 families were involved in the Tendu patta collection. The third number is the Bramhapuri forest division where 23,623 families are involved in the collection. This no. of families is apart from CFR. In this collection, there are huge economics involved, locals get benefit from the patta collection.

In Chandrapur district, in 2019, 52,703 families went into the forest and collected tendu patta. These families were from Central Chanda, Chandrapur, Bramhapuri, and Tadoba buffer division villages. If we consider, from each family, a minimum of 2 members visiting the forest for collection, the total number of collectors reached more than one lakh. This collection lasts for 15–25 days in the peak summer of May. These villagers are in the forests for 6 to 8 hours daily. They traveled daily around 5 to 10 km for collection. More than one lakh people venture into the forest for 15–20 days and 6–8 hours daily, which is a massive disturbance in the forest. On the other part, the district has more than 200 tigers in the forest. So, the possibility of conflict rises in this collection. From 2013 to 2022, 11 human deaths occurred during patta collection in the district.



In its study, the BNHS team noticed that the tendu patta collection is not sustainable harvesting. The team observed that the villagers cut medium-sized trees to collect leaves. Due to the over-harvesting of tendu leaves, villagers venture deep into the forest or into the core area where trees are thriving.

Villagers also harvest tendu fruits. The flip side of this collection is tendu fruit is the favorite and nutritious food for herbivores. But the villagers do not think about them and rush for the collection.

INTRODUCTION

Tendu (*Diospyros melanoxylon*) is a species in the family *Ebenaceae* native to India and Sri Lanka. Tendu leaves collecting, one of the NTFPs found mostly in Central peninsular India. The collection of Tendu leaves is being given appropriate focus by the government owing to its use in wrapping *bidi* (local cigarette) on the one end and livelihood and revenue generation for locals and the state forest department. Tendu leaf yield in India is assessed to be approximately 3.5 lakh tons of leaves worth \$200 million collected each year from forests (Kaur, 1991), with Madhya Pradesh accounting for 25%, Chhattisgarh for 20%, Odisha for 15–20%, Maharashtra serving for 10%. The country's *bidi* production also reveals that India sold 740 billion *bidis* in 1970, 990 billion in 1993, and which increased to 1.2 trillion *bidis* yearly in 2005-06. Furthermore, it is estimated that Tendu leaves plucking alone employs around 7.5 million people, notably during the off-peak agricultural season, even though rolling *bidis* employ roughly 4.4 million women and children (Ministry of Labour, 2000) ensuing India produces 600 billion to one trillion *bidis* annually. Tendu leaves employ 106 million people in collecting and 675 million people in secondary processing (World Bank, 2006).

In the Vidarbha landscape, the tendu patta collection is the most important activity in forested areas, which has high economic value for local villagers. The collection is started in May in all the forest divisions of Vidarbha. Thousands of people venture into the forest for tendu leaf collection. Leaves of many other plants like Palash and Sal etc. also find use as *bidi* wrappers in different parts of the country but the texture, flavor, and workability of tendu leaves are unmatched. The wide-scale use of tendu leaves in the *bidi* industry is mainly based on their enormous production, agreeable flavor, flexibility, resistance to decay, and capacity to retain fires.

In Maharashtra along with the forest department, Non-PESA, PESA, and CFR are also incorporated in the patta collection. Forest department figures showed in 2012, a total of Rs 105 crores was given as wages to 4.5 lakh families for the collection of patta. This is the highest labor paid by the department in the last fifteen years. In 2015 Rs. 42.83 crores, in 2016 Rs. 55.59 crores, in 2017 Rs. 63.9 crores, in 2018 Rs. 37.77 crores and 2019 Rs. 45 crores was the labor cost distributed in Maharashtra. Also, the bonus amount is given to the collectors separately. This is one of the livelihood generation activities for many families from the forested area of Vidarbha.

As per the forest department record, in 2017 forest department received a royalty of Rs 160 crores, the highest amount of all time. In 2018, the amount is Rs 50 crores. In 2019, the amount is Rs. 38 crores, in 2020 due to the pandemic the amount was reduced to Rs 26 crores and in 2021 the amount was Rs. 52 crores. After deducting the administrative expenditure cost, the remaining amount is distributed as a bonus to the collectors.

METHODOLOGY

To comprehend the tendu patta collection pattern, distance travelled by the collectors, threats, impact on the forest, and the economy behind this collection, the BNHS team surveyed 7 villages from all the landscapes for the pilot study. The BNHS team accompanied the tendu patta collectors in Madnapur, Palasgaon, and Talodhi villages from the Tadoba buffer, Khapa village from the Pench buffer, Umarzari and Dhamanewada from the NNTR buffer, and Mahi from the Bor tiger reserve. The BNHS understood the collection pattern and, they also track the route of the same through GPS. The team also gathered tendu patta collection data from all the forest divisions in 5 districts of east Vidarbha.

Calculation of Impact Zone

The impact zone for the tendu patta 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.

COLLECTION PATTERN

Traditionally, leaves and fruits (*Tembaru*) are harvested by the local villagers. There is a huge economy behind the collection of leaves. So, villagers of all the economic status are involved in the collection. The collection season lasts hardly 20 to 25 days in peak summer. Being peak summer, villagers are venturing into the nearby forest early morning at 5 to 6 with a group of 5–7 people, including women. It is observed that the percentage of women pluckers is higher than that of men. The collectors climb the trees, cut small, and big branches, and collect the leaves. Women and men collect the leaves in the sari pouch or cloth tied to their waist. Around 12-1, pm they return to the village. After the meal, all family members make bundles (*Puda*). Each *puda* contains approx 70 leaves. In the evening this bundle is handed over to the nearby collection center (*Phadi*).



After collection, the dried leaves are transported to the contractor's warehouses. The patta collection data is maintained by the contractor's assistant (*Phadi munshi*) and forest guards. A family residing near the forest earns about Rs. 5,000 to 25,000 for the collection in the season, which is the highest of all the forest produces.

PATTA HARVESTING IMPACT

After getting a contract for a patta collection unit, a contractor appoints local people for tree pruning or bush cutting, which is an important operation in the tendu leaves production process. To save on bush-cutting costs villagers burnt the undergrowth of the forests for better leaf production. This is a common practice in all landscapes. A few years back, there were regular forest fires in Tendu patta collection areas. Now the forest department imposes various rules, including forest fires after sanctioning of tendu patta collection contract. But this rule is abided by the contractors sometimes. The most important restriction is, the collection center (*phadi*) must be 3 km away from the core boundary of the tiger reserve. But villagers ventured into this core forest for collection and collect a good amount of patta.

In the Chandrapur forest circle which comprises Bramhapuri, Central Chanda, and Chandrapur forest divisions, in 2019 there were 285 fire cases in which 399 Ha Forest was destroyed. During the pandemic year, the fire cases were only 128. In the next year, it jumps to 624 in which 3517 Ha was burnt. This is a huge loss of forest in fire every year, especially in the patta collection season. In the Tadoba buffer area in 2019, there were 69 fires in which 424 Ha of the forest was burnt. In 2020 area burnt was only 17 Ha and in 2021 in 41 fire cases, 410 Ha was burnt as per the department data. In the Pench buffer area of Maharashtra, there were 6 and 21 forest fire incidences in 2017-18. This year the Nagalwadi range was worst hit by fire in which 470 Ha of the forest was burnt. In 2020-21 there were only 7 cases recorded in the Pench buffer.

The collection method is also crude and unsustainable as our team noticed when they accompany these villagers at the time of collecting in the forest. The team observed that the villagers cut medium size tress to collect fresh, young leaves. It is seen that the trees in the buffer area and corridors are badly cut, which results in the local extinction of these trees. Due to the unavailability of trees in nearby areas, villagers try to venture deep into the forest or into core areas where trees are thriving. Villagers also accept the overexploitation of tendu trees. In the early morning, wild animals are active in the forest. The presence of villagers at this time disturbs the movement of animals. Villagers also harvest tendu fruits. This fruit is the staple diet of many herbivores and Sloth bears. Tendu fruit is also harvested extensively, so it affects the regeneration of the plant. Harvesting of this fruit is also a crude method that was observed in the Karwa buffer village of Tadoba. The collectors throw big stones at the trunk of the tree for falling the fruits onto the ground. Due to this, there is a huge cut on the tree and gradually the tree becomes weak. Due to destructive collection patterns, the trees are going extinct in many areas.

When the villagers venture into the forest to collect patta, they are vulnerable to attacks from wild animals, which leads to human-wildlife conflicts. In the Chandrapur district, from 2013–2022, 11 villagers lost their lives in wildlife attacks; 4 were killed by a Sloth bear and the rest by tigers when these people were collecting patta in the summer.



Due to destructive collection patterns, the tendu trees are going extinct in many areas





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Pic from Central Chanda division



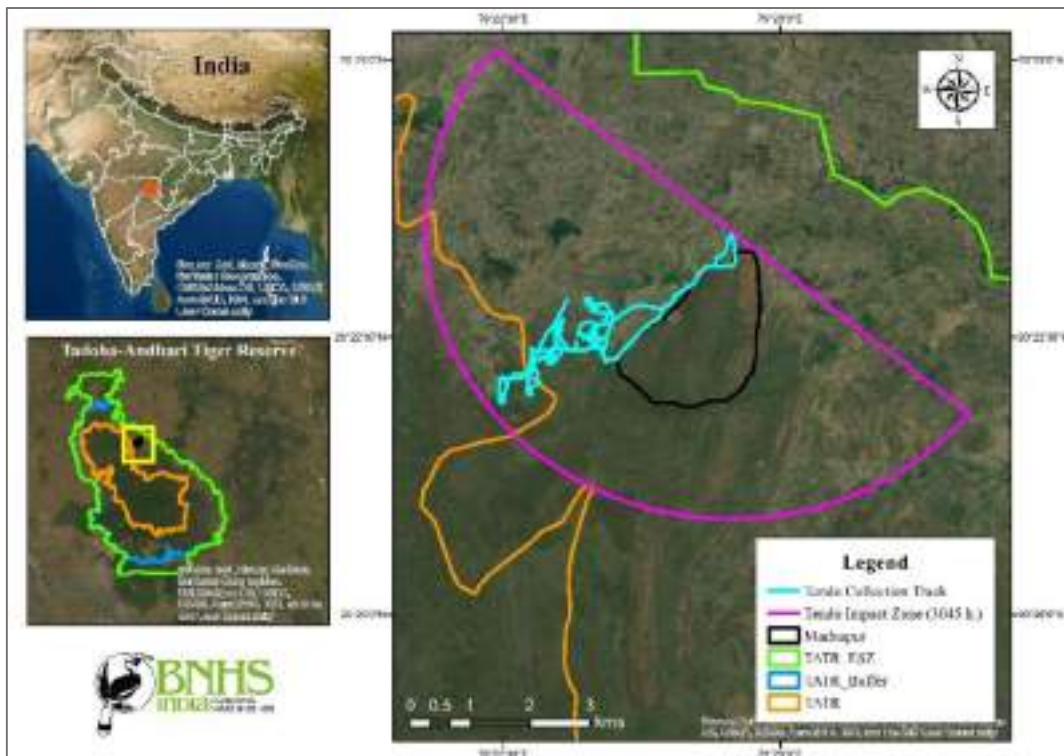
TENDU PATTA COLLECTION STUDY IN VILLAGES

The BNHS team studied the tendu patta collection of 7 villages from all the landscapes to understand the pattern, economy, and harvesting methods of the collectors.

MADNAPUR- TADOBA BUFFER

Madnapur is one of the Tadoba Andhari Tiger Reserve's buffer villages. The village has a buffer tourism gate as well as a beautiful camping site established by the tiger reserve. This village has 216 families. Agriculture is the primary occupation, with labour work coming in second. 49 families from this village were involved in the tendu patta collection in 2019. In 2020, 78 families participated in the collection; in 2021, 27 families collected the patta. The villagers collected 62,080 bundles (puda) in 2019, 53,160 in 2020, and 99,280 in 2021 from the forest.

In 2021, a BNHS staff accompanied the team of villagers in the tendu patta collection and understood the pattern of the collection. According to our observations, every day, the collectors began their journey into the forest at 5 am to collect tendu leaves and returned at 1 pm. The collectors carried snacks and water bottles with them. They mostly explore the forest on foot, but they also ride bicycles and motorbikes. After entering the forest, they kept their stuff under a tree and dispersed in small groups to collect tendu patta.



Map 1: Madnapur Tendu patta collection track

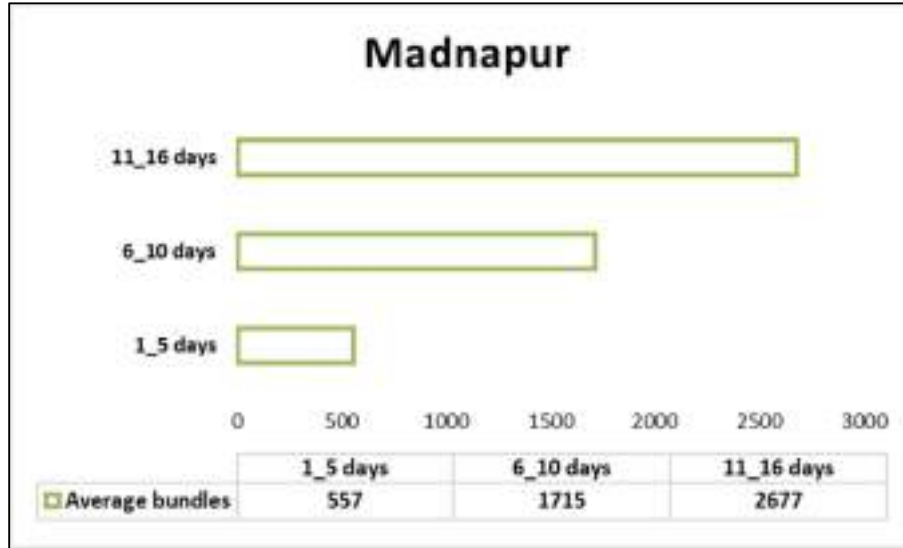
Then they began to pluck the patta with an axe, bending the trees or climbing the trees and cutting the branches. Most of the time, women pluck the leaves and collect this patta in cloth pouches tied to their waste. During this time, they make noises to keep themselves safe from wild animals. These pouches were emptied into gunny bags that they carry with them. This plucking and collecting exercise continues until noon. It has been observed that the villagers visit both the buffer and core areas of the forest as they are familiar with the paths and trees in the forest. This collection pattern is not sustainable, as observed during the collection process. They cut the branches, medium-sized trees, and young leaves during the collection. The villagers travel 7–12 km for collection every day. In this collection, more than three thousand Ha of forests were impacted.

After returning home, they began to separate the leaves and make bundles (puda). Threads from the Indian screw tree were used to tie the puda. Depending on the number of family members in the collection, one family can make 150–200 puda in a single day. In the evening, they deposited these puda at a collection center (phadi) in the village. Tendu patta was collected by 57 families in 2021. This season, the maximum number of collection days was 15.



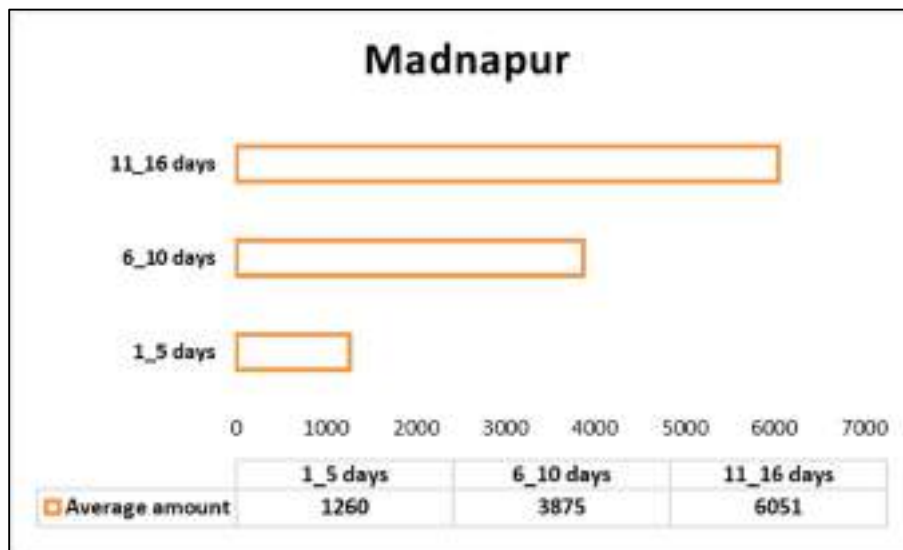


All family members involved in the tendu patta bundle making



Graph 1: Tendu patta collection days and bundles

In the above figure, the average bundles collected in a particular period are depicted. In a 1-5-day slot, the average collection was 557 bundles, whereas, in a 6 to 10 days slot, the collection raised to 1715 bundles on average. The average was highest in the 11 to 16 days slot at 2677 bundles. More days the collection occurs the more the average bundles. In 2021, villagers collected a total of 99,460 puda from the forests.



Graph 2: Income from Tendu patta collection

The above figure depicts the average income in a particular slot. In a 1 to 5 days slot, the average income is Rs. 1,260, whereas, in 6 to 10 days, the average income is Rs. 3,875 and in the 11 to the 16-day slot, the income is highest at Rs. 6,051 per family.

4 families out of 57 collected tendu patta for a full 15 days. These families earned Rs. 6,418 to Rs. 9,729 from the collection. One family collected tendu patta for 14 days. By collecting 4,775 puda, they earn Rs. 10,791, which is the highest amount collected from this village. Four

families travelled from this village for one day only, earning only Rs. 214 in the collection. The rate this year (2021) was Rs. 226 per 100 *puda*.

The number of persons in the family is important to calculate the collection of money. In the forest department record, only the name of the family head/woman is mentioned. The family members involved in the collection are not mentioned in the record book. So, it is difficult to calculate the total number of collectors.

In our study, the team found that 2 to 5 members of the family were involved in the patta collection. The villagers earned Rs. 2, 24,779 from the collection of patta this year.



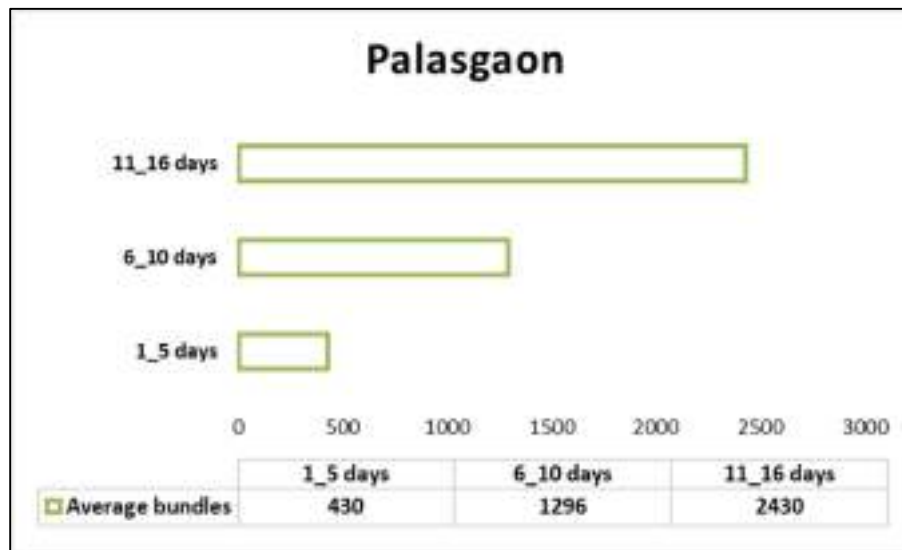
In our study, the team found that from each family 2 to 5 members were involved in the patta collection



PALASGAON -TADOBA BUFFER

There are 250 families in this buffer village. Most families rely on agriculture and bamboo work. In 2019, 159 families collected tendu patta and made 4, 47,790 puda. Due to a technical issue, no one could collect tendu patta in 2020. In 2021, 104 families collected tendu patta from the forest's buffer and core areas, totaling 1, 61,620 puda. Some families collected tendu patta from the core area in 2021. This was noticed by tiger project staff, who have been restricted from collecting patta in this area and were granted permission to collect patta from the Khadasangi buffer range, which is 60 km away from Palasgaon village. These people collected tendu patta from the Khadasangi range on motorcycles.

The pattern of collection is the same as in Madnapur and other villages. This year, the collection period was limited to 17 days.

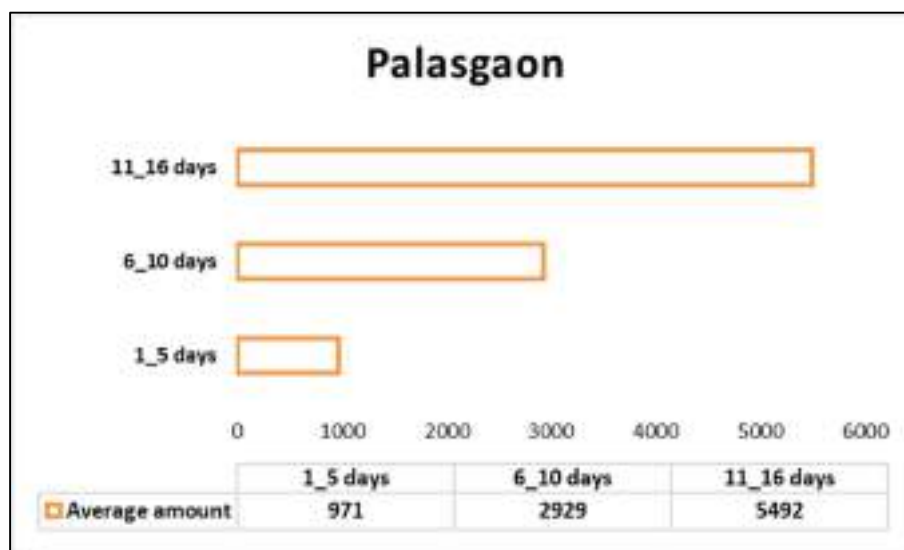


Graph 3: Tendu patta collection days and bundles

In the above figure, the average bundles collected in a particular period are depicted. In a 1 to 5-day slot in Palasgaon village, the average collection is 430 bundles, whereas, in a 6 to 10 days slot, the collection raised to 1,296 bundles on average. The average was highest in the 11 to 16 days slot at 2,430 puda per family. In this village, in 2021, a total of 1, 61,700 puda was collected by the villagers.



Palasgaon villagers collected patta from the Khadasangi buffer range, which is 60 km away from the village. These villagers used motorcycles to collect this patta



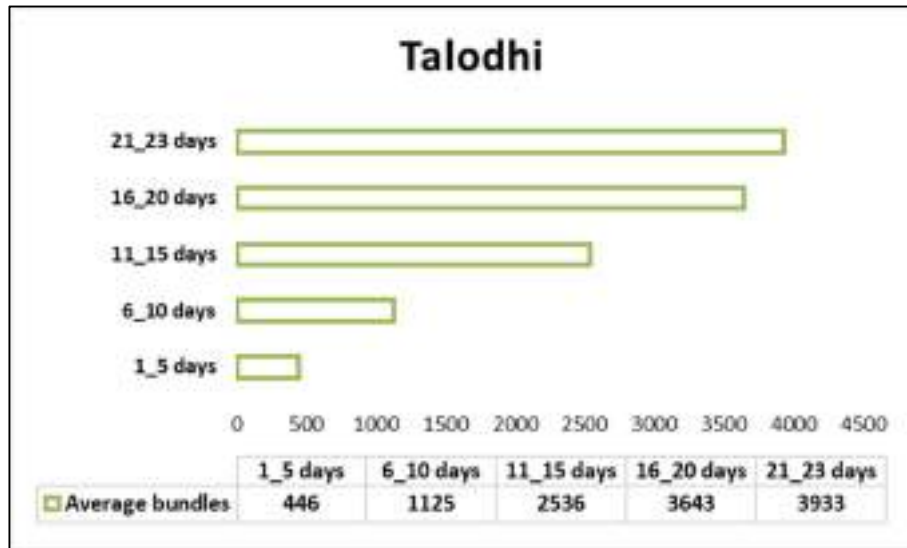
Graph 4: Income from Tendu patta collection

The above figure depicts the average income in a particular day slot. In the 1 to 5 days slot, the average income is Rs. 971, whereas in 6 to 10 days the average income is Rs. 2,929, and in the 11 to the 16-day slot, the income is highest at Rs. 5492. Three families collected patta for 15 days and earned more than Rs. 10,000 in the collection. A family went into the forest for 17 days, collecting 7,880 puda and earning Rs. 17,808 from the collection, which is the highest amount earned in the patta collection. A total of Rs. 3, 65,442 was distributed to the collectors by the contractor in this village.



TALODHI- TADOBA BUFFER

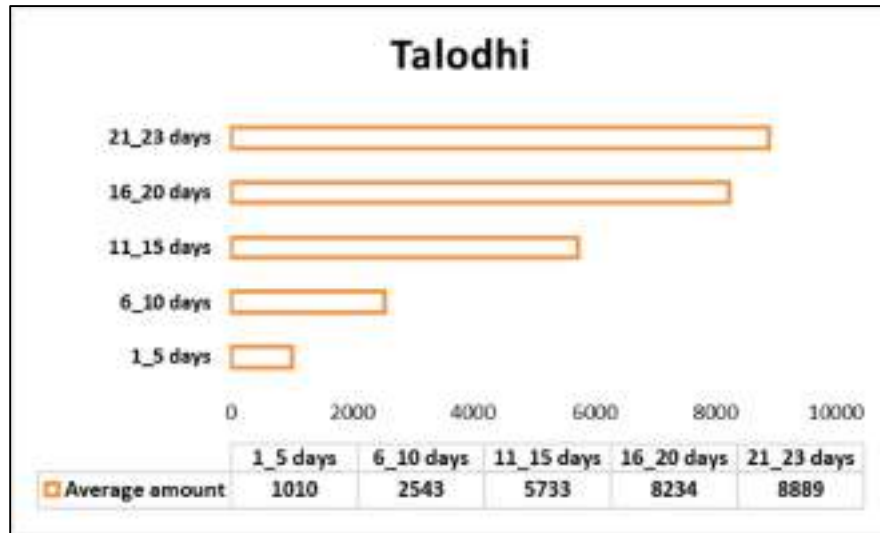
The total number of families in this buffer village is 447. Agriculture is the primary occupation. There are two tendu patta collection centers in this village. In total, 486 families collected tendu patta from the nearby forest in 2019. Many families from other villages also collected tendu patta and deposited them in this village phadi. 11, 45,200 puda were deposited in these two centers. Due to a technical issue, the collection was not done in 2020. The patta was collected by 351 families in 2021. Talodhi villagers gathered tendu patta from both the buffer and core forests. The villagers mostly used bicycles and motorcycles to travel for collection. The pattern of the collection is nearly identical to that of other villages in this landscape. In 2021, a total of 3, 91,230 patta was collected, and Rs. 8, 84,180 were distributed to the collectors in this village.



Graph 5: Tendu patta collection days and bundles

In the above figure, in a 1 to 5-day slot in Talodhi village, the average collection was 446 bundles, whereas, in a 6 to 10 days slot, the collection raised to 1125 bundles on average. In 11 to 15 days slot the average is 2536 bundles. In 16 to 20 days 3,643 and the highest collection is at the 21 to 23 days slot where an average of 3933 bundles was collected.





Graph 6: Income from Tendu patta collection

The above figure depicts the average income in a particular day slot. In the 1 to 5 days slot, the average income is Rs. 1,010, whereas in 6 to 10 days the average income is Rs. 2,543, and in the 11 to 15-day slot, the income is Rs. 5,733. In the 16 to 20 days slot, the average income is Rs. 8,234, whereas, in the 21 to the 23-day slot, the income is Rs. 8,889 on average. In 2021, the tendu patta season lasted for 23 days. A single family from this village collected 20 days and earned Rs. 26,815, which is the highest amount in this village. 26 families from this village earned between Rs. 10,000 and Rs. 15,000.



TENDU PATT A COLLECTION IN TAD OBA BUFFER

In the Tadoba Andhari Tiger Reserve (TATR) landscape, the tendu tree is commonly seen in the forest. The patta collection is managed by Tadoba management in the selected 53 villages of the buffer zone. In the Tadoba buffer, there are 92 villages and the family number is around 23,000. There are 10 tendu units namely Palasgaon, Shivani, Maroda, Fulzari, Peth, Ghantachauki, Varvat, Aagarzari, Nimdhela, and Tekepar. This data was given by the buffer division of Tadoba.

Familywise Tendu leaves bundle collection from TATR buffer								
Sr.No.	Unit no. & Name	Collection center	2019		2020		2021	
			Family involved	Total puda collected	Family involved	Total puda collected	Family involved	Total puda collected
1	01-Palasgaon	1. Madnapur	49	62080	78	153160	57	99280
		2. Karbada	68	86900	38	71870	51	67510
		3. Masal	96	115910	96	56870	0	0
		4. Piparda	84	179290	143	259240	108	206100
		5. Palasgaon	159	447790	0	0	104	161620
		6. Gondmohadi	40	43850	211	506400	165	336280
		7. Vihirgaon 1	132	295850	110	260090	103	219670
		9. Belara	40	46560	54	150760	57	104270
		Total....		668	1278230	730	1458390	645
2	02-Shivani	10. Wasera	179	276010	103	171200	108	132230
		11. Shivani	134	129430	210	257400	96	67580
		12. Naleshwar	129	256620	151	234290	142	290630
		13. Kukadheta	190	377090	268	501720	199	330420
		14. Pethgaon	140	198670	103	159070	104	136075
		15. Jamsala-2	221	277320	157	192740	145	210510
		16. Khatera	51	81880	41	89050	52	82050
		17. Chak Bamni	106	102560	92	92535	61	62465
Total....		1150	1699580	1125	1698005	907	1311960	
3	03-Maroda	18. Maroda	285	353350	227	305995	163	299365
		19. Bhadurna	191	319400	123	211150	112	284350
		20. Ratnapur	80	152410	67	70420	61	124470
		22. Shivapur	51	75830	51	96860	81	146310
		23. Padzari	37	94130	32	83130	37	88170
		24. Katvan	27	25910	78	147385	0	0
Total....		671	1021030	578	914940	454	942665	
4	04-Phulzari	25. Phulzari	107	542040	0	0	0	0
		26. Doni	135	325945	0	0	0	0
		Total....		242	867985	0	0	0
5	05-Peth	27. Haldi	88	245260	0	0	0	0
		28. Peth	47	93930	0	0	0	0
		Total....		135	339190	0	0	0

6	06-Ghantachauki	29. Borda	133	221910	114	186650	106	323960
		30. Vaygaon	128	268570	124	219050	114	235040
		31. Dudhala	50	79310	54	92760	34	60160
		32. Valni Talav	121	465090	68	207340	49	138040
		33. Nimbala	130	281620	151	406335	95	152770
		34. Chak Nimbala	95	90130	115	210275	70	140900
		56. Ghantachauki	89	241590	0	0	0	0
		Total....	746	1648220	626	1322410	468	1050870
7	07-Varvat	35. Varvat	200	277830	93	206410	117	286820
		36. Chorgaon-1	207	347580	173	471460	165	629670
		37. Chorgaon-2	76	102770	0	0	0	0
		38. Mamla	221	478180	121	257420	91	247550
		39. Masala	39	75260	31	70040	0	0
		Total....	743	1281620	418	1005330	373	1164040
8	08-Agarzari	40. Kinhala	340	727570	0	0	233	684900
		41. Kokewada	104	206740	0	0	156	332050
		42. Navargaon Chauki	0	0	0	0	0	0
		43. Adegaoon	177	320270	120	341380	111	279210
		44. Pardi	0	0	0	0	0	0
		45. Agarzari	91	223160	147	318920	96	243620
		46. Vadholi	170	522140	63	154540	50	206730
		Total....	882	1999880	330	814840	646	1746510
9	09-Nimdhela	47. Vaygaon Bhojar	98	200400	0	0	71	50250
		48. Nimdhela	179	328800	0	0	69	131450
		49. Ramdegi	0	0	0	0	26	55240
		50. Alianza	45	140100	0		35	190675
		Total....	322	669300	0	0	204	427615
10	10-Tekepar	51. Tekepar	114	170000	0	0	44	54510
		52. Talodhi-1	276	609500	0	0	142	395800
		53. Talodhi-2	210	535700	0	0	32	67245
		54. Compt. No. 53	0	0	0	0	63	147690
		55. Compt. No. 53	0	0	0	0	114	479540
		Total....	600	1315200	0	0	395	1144785
		Grand Total....	6159	12120235	3807	7213915	4092	8983175

Source: TATR

From the above table, it is revealed that, in 2019, there were 6,159 families involved in the patta collection. These families collected 1,21,20,235 puda from the buffer forest. There are 70 leaves in a puda, so these families plucked a total of 84,84,16,450 leaves from the buffer area. The waste leaves are not counted in this. In 2020, due to pandemics, some collection centers were closed. So, that year only 3,807 families collected 72,13,915 puda. In 2021, in collection 4,092 families were involved who collected 89,83,175 puda. In the Shivani buffer round, more than 1,000 families were involved in tendu collection over the last 3 years. In the Aagarzari round also, tendu leaves are collected in big numbers. In 2019, the labour cost paid to collectors was appr Rs. 2 crore 75 lakhs whereas, in 2021, the labour cost paid by the

contractors to collectors in Rs. 2,03,91,807. This cost excludes bonus costs paid by the government.



In the Tadoba buffer, in 2021, a total of 4,092 families were involved in the patta collection, who collected 89, 83,175 bundles

KHAPA -PENCH BUFFER

The BNHS team studied the collection pattern of tendu leaves in the Khapa buffer village of Pench Tiger Reserve. This small village, located on the fringe of the core area has 70 families. The village is tribal. This village has no *phadi* because it is adjacent to the core area. The collectors deposit tendu patta at the Zinzeria phadi. This year, 21 families collected 41,250 puda. BNHS noticed that one family makes 300 puda daily on average.

Our team accompanied the collectors for five days. The villagers began going to the forest for tendu patta collection between 5:30 to 6:00 am and returned at 12:00 to 12.30 pm. They all went in groups of four to five. The percentage of women in these groups is higher than that of men, and the age range is 30–55. Villagers carried gunny bags, a sickle, a sari cloth, and a water bottle with them. Because the core area is adjacent to the village, villagers can easily collect the patta from this area.

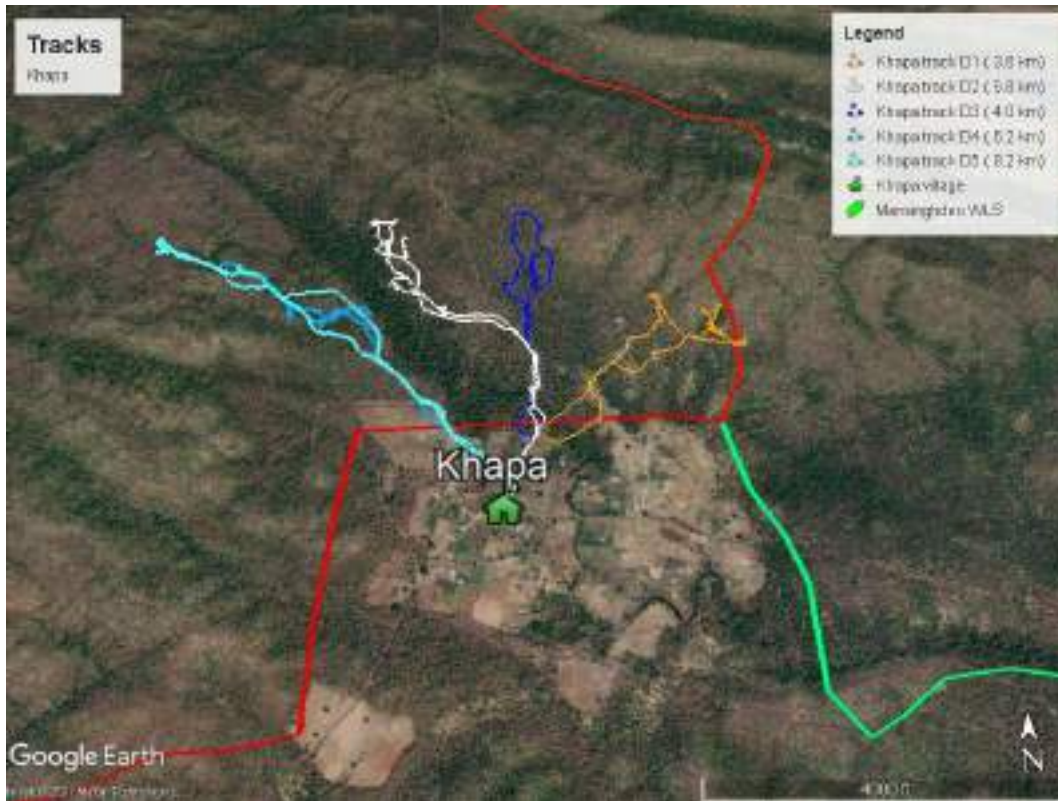


It has been noticed that from a single-family, maximum of 3 persons went into the forest for collection. During collection, the collectors bend the trees and pluck the leaves. They selected medium-sized leaves. If not possible to bend the tree, they cut the tree and collect the leaves. Women also climb trees and cut the branches. Our team discovered that this collection pattern was unsustainable. It has been observed that the collectors are frequent visitors to the forest and have taken no precautions to ensure their safety. The collectors were not afraid of wild animals while exploring the forest.

The team saw Wild Boar, Nilgai, and kill of Chital along the path and inside the forest. The villagers took 6 hours to collect the patta in the forest. During these five days of collection, the collectors covered 27.8 km in the core area.



Villagers selected medium-sized leaves. if not possible to bend the tree, they climb the tree and cut the branches, and collect the leaves



Map 2: Khapa Tendu patta collection track

TENDU PATTA COLLECTION IN PENCH BUFFER

There are Tendu trees in the territorial forest of the PENCH landscape in the Nagpur district. Previously there were many collection centers in the PENCH landscape before the declared buffer zone. But after restrictions of the tiger reserve, many collection centers are closed. Currently, there are 2 tendu collection units under PENCH tiger reserve management. On the east side of PENCH TR units are Zingeria and Pathrai. Zinzeria unit covers phadi in Dongartal, Zinzeria, Wagholi, Salai, Maudi, Hivara, Chargaon, Sawara, Kadbikheda and Kamathi village. Earlier there was phadi in Khapa village. But due to the 3 km restriction, it was closed. But still, Khapa villagers collect tendu leaves and deposit them at Zinzeria phadi. In the Patharai unit, the villages are Jamuniya, Ghoti 1 and 2, Ambazari, and Patharai itself. Three units are in West PENCH namely Suvadharma, Surewani, and Pendhari respectively. In the Suvadharma unit, the phadi are in Gargoti, Shiladevi, Banera, Savangi, Dhawalapur, Narhar, and Suvadharma itself. In Surevani, the phadi are in Surevani itself and Ghatkukada village. Pendhari, Sitagondi, and Piparvani villages, also have collection centers.

Here are the details about the tendu patta collection in the last 3 years in PENCH buffer villages. This information was given by tiger reserve management.

Tendu patta collection in Paoni unified control range (East Pench)

Sr. no.	Range	Unit Name	Collection Centre	2019		2020		2021	
				Family no.	Total Puda	Family no.	Total Puda	Family no.	Total Puda
1	Paoni UC	Zinzeria	Salai	80	96690	0	0	72	91520
2			Wagholi	144	154810	131	174250	113	194480
3			Sawara	126	123410	118	127030	119	175750
4			Kadbikheda	131	147880	118	139480	111	158110
5			Kamthi	85	69950	57	36340	50	53600
6			Dongartal	59	50670	42	42860	41	32310
7			Hiwara	59	82150	119	160960	40	53240
8			Maudi	124	169630	75	87660	75	75320
9			Zinzeria	96	104410	97	78290	101	165170
			Total	904	999600	757	846870	722	999500
10		Patharai	Jamuniya	39	35220	45	48920	42	53610
11			Patharai	101	107330	101	88410	98	96470
12				109	140360	114	128150	93	131250
13			Ghoti 1	18	19180	0	0	28	36320
14	Ghoti 2		72	63850	86	105650	50	60340	
15	Dahoda	94	104090	114	112620	96	120910		
		Total	433	470030	460	483750	407	498900	
		Grand Total	1337	1469630	1217	1330620	1129	1498400	



In the Pench tiger reserve buffer in 2021, the villagers received Rs.67 lakhs as labour for patta collection

Tendu patta collection in West Pench

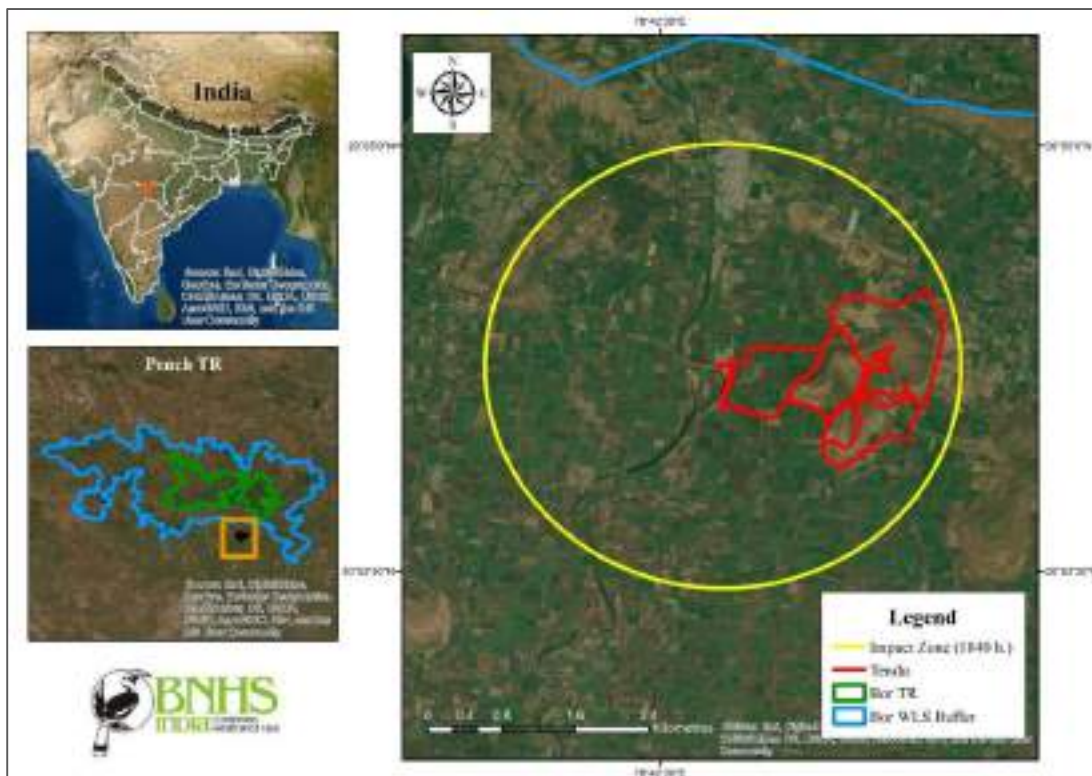
Sr. no.	Range	Unit Name	Collection Centre	2019		2020		2021	
				Family involved	Total Puda collected	Family involved	Total Puda collected	Family involved	Total Puda collected
1	West Pench	Suvardhara	Chargaon	78	102490	54	118640	73	124880
2			Gargoti	122	193150	123	235710	112	157300
3			Shiladevi	56	158200	13	15930	20	23210
4			Banera	163	250070	70	156780	136	269720
5			Sawangi	0	0	0	0	0	0
6			Dhawalapur	107	173790	97	254700	108	232930
7			Narhar	0	0	0	0	0	0
8			Suvardhara	81	114720	0	0	79	189750
			Total	607	992420	357	781760	528	997790
9		Surewani	Surewani A	0	0	0	0	73	267940
10			Surewani B	0	0	0	0	48	158320
11	Ghatkukada		0	0	0	0	0	0	
	Total	0	0	0	0	121	426260		
12	Pendhari	Sitagondi	54	127700	0	0	0	0	
13		Piparwani	433	136770	0	0	33	59935	
	Total	487	264470	0	0	33	59935		
	Grand Total	1094	1256890	357	781760	682	1483985		

From the above table it is seen that during 2019–2021, in the Pavani range, an average of 1,200 families from 15 villages collected tendu patta from the nearby forest. In 2021, the villagers harvested 14,98,400 puda from the East Pench forest. From the Zinzeria tendu unit, Wagholi, Sawara, and Kadbikheda villagers harvested more tendu patta than other villages. In the Patharai tendu unit, Patharai and Ambazari villagers collected maximum tendu leaves. The data from the tiger reserve showed that in West Pench, there are 3 tendu units in 13 villages. In 2019, maximum tendu leaves (2, 64,470 puda) were collected from 1094 families, whereas in 2020 only 357 families collected tendu leaves due to the pandemic situation. Again in 2021, 682 families were involved in harvesting tendu leaves, which is an increase in number. In some villages, harvesting is banned due to proximity to the core area. In 2021, 1,757 families collected tendu leaves from 24 villages from East and West Pench TR. The average rate of Tendu leaves is Rs. 227/100 puda. *From the above table*, it is seen that in 2021, in West Pench, the labour cost distributed to pluckers is Rs. 33, 68,646. In East Pench, the labour cost is 34, 01,368. On both sides of Pench, the total labour cost in 2021 is more than Rs. 67 lakhs.

MOHI -WARDHA FOREST DIVISION

Mohi is a Wardha territorial forest division village near the Bor tiger reserve. 185 families are living in this village. Agriculture is the main occupation, and the main crops are groundnuts, sugarcane, and irrigated cotton. As these are cash crops, farmers in this area can earn a sufficient income from agriculture. In comparison to other landscapes, forest produce collection is not their primary source of income. This village is a 6 km crow flight from the Bor tiger reserve.

This year, only 13 families collected tendu patta. They gathered patta from the surrounding hilly area. This hilly area is surrounded by agricultural fields. Collectors are between the ages of 40 and 45. The tendu patta is collected by a group of 7–8 people. The collection center (phadi) is in the village. In 2021, the season lasts for 16 days in May. Tendu patta collectors carry gunny bags, a sickle, a sari cloth, a tiffin, and a water bottle.



Map 3: Mohi Tendu patta collection track

The BNHS team discovered that the number of men and women in the collection is the same. The team accompanied these collectors at 4:40 am to reach the collection area and returned home between 9 and 10 pm. They collected the leaves on the ground, bend the tree, and pluck the leaves during collection. They also climbed the tree and picked the leaves. They gathered a variety of medium-sized leaves. After returning home, everyone in the family was involved in making the puda. Every day, 150–200 puda are prepared by each family. The bark of the Palash tree is used by the villagers to tie the puda. In a season, a family earns Rs. 5–7 thousand approximately informed by phadi munshi.

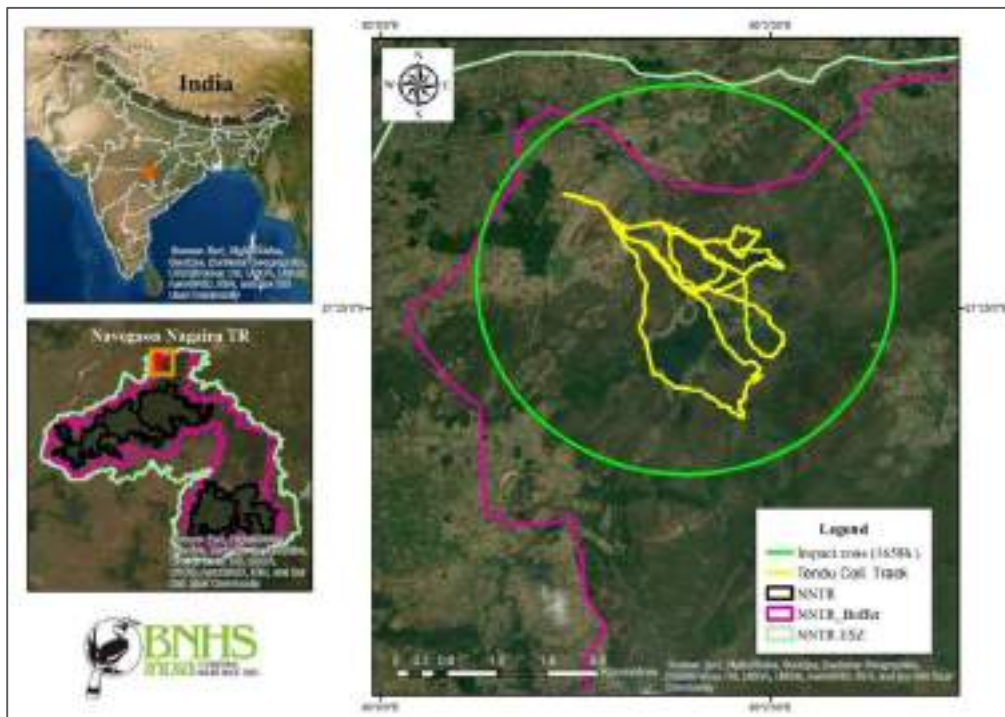


In 2021 only 13 families collected tendu patta in Mohi village. They collected patta from the surrounding hilly area

DHAMANEWADA -NAVEGAON-NAGZIRA BUFFER

Dhamanewada is a village in the Gondia forest range in the Gangazari tendu patta unit with 340 families. The BNHS team accompanied the villagers and took 5 tracks of collection to understand the pattern. The *phadi* is in this village. This year's tendu patta collection involved a total of 54 families in this village. The collection began on 5th May and continued until 28th May. The team carried out 5 tracks from the 20th to the 24th of May. For five days, the team accompanied Rajendra Sonwane. Rajendra's primary occupation is agriculture, and he is 42 years old. For the last 25 years, he has been collecting tendu patta. The patta is collected by both husband and wife. They earned Rs. 7,300 last year. In this season, every day, the couple made 200 puda on average.

Three women and two men accompanied Rajendra for collection. During these five days, all collection takes place in the buffer zone. The pattern of the collection is the same as in other landscapes. It was noticed that the collectors did not pluck young leaves during the collection. They only pluck leaves of medium size. They had a 20–25-foot distance between them while travelling through the forest, and they used to talk loudly to each other. The team encountered indirect signs of wildlife and saw a Nilgai and Wild boars while collecting. When the collectors saw Wild boars, they made a noise to scare them away. On the first day of collection, the group travelled 3.6 km and 5.8 km on the second day. The team travelled 4 km on the third day, 6.2 km on the fourth day, and 8.2 km on the fifth day. This group was in the forest till 4 pm. They travelled 8.2 km in 7 hours on the last day. In the initial days, collectors collected tendu patta from the surrounding village area. However, after a couple of days, they collected patta from deep inside the forest.



Map 4: Dhamanewada Tendu patta collection track



In the initial days, collectors collected tendu patta from the surrounding village area. However, after a couple of days, they collected patta from deep inside the forest



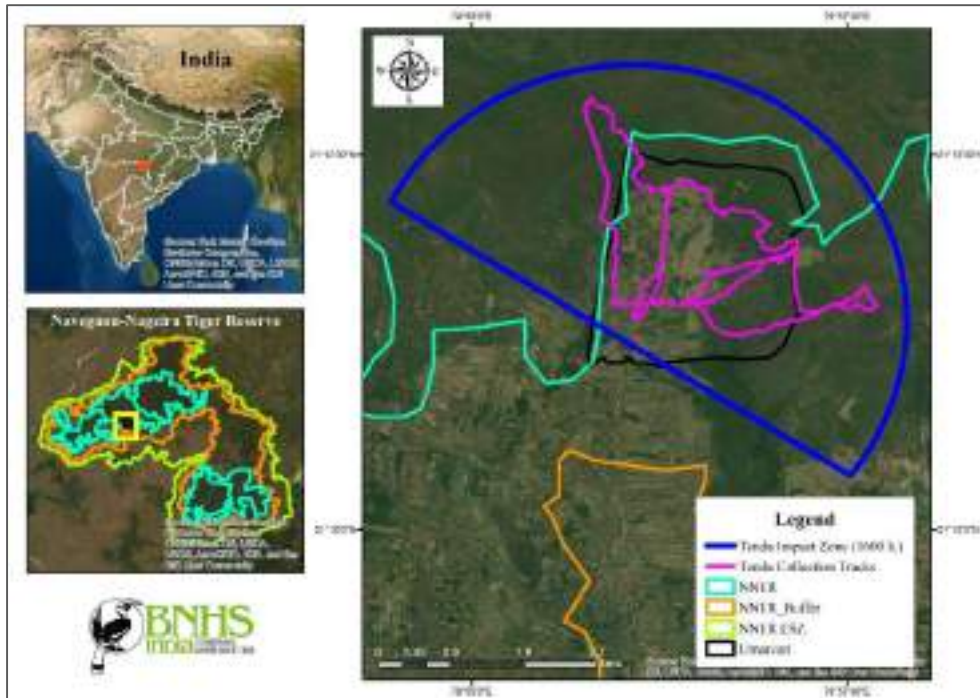
UMARZARI -NAVEGAON-NAGZIRA BUFFER

This is the nearest fringe village to the core area of the Navegaon-Nagzira Tiger Reserve, with a tourism gate. This village is in the Gondia forest range and the Gangazari unit of the tendu patta. In this village, there are 172 families. A total of 45 families collected tendu patta in 2021.

The BNHS team accompanied Dasharath Puram for three days to better understand the collection pattern. Dasharath Puram (age 45), is an agriculturist. He has been collecting tendu patta for 15 years. According to Dasharath, regular forest fires were observed in this forest before the declaration of the tiger reserve. He made Rs. 5000 last year from the collection. Even though the core area is closest to the village, there is a phadi in the village. Dasharath collects tendu patta with his wife and daughter. The team and the collectors went into the forest at 4 am and returned at 10 am. The collection began on 7th May and ended on 28th May.

The GPS tracks were recorded between the 26th and 28th of May. They were accompanied by their dog. During the collection, they kept an eye out for Gaur and other signs of wild animals. The group travelled 8 km in the buffer area on the first day, 6.9 km on the second day, and 7.4 km on the third day. They collected patta from the core area on the third day. In this collection around 1600 Ha area was disturbed by the collects as per our tracks.





Map 5: Umarzari Tendu patta collection track



BNHS also collected information from the forest department about tendu patta collection from 7 forest divisions.

BHANDARA FOREST DIVISION

Tendu patta is harvested in Gondia and Bhandara districts in large quantities followed by Gadchiroli. In 2021, there are 53 tendu patta units in the Bhandara forest division which covers 325 *phadi*. There are collection centers in 24 villages in the Jamkandari forest range. There are 13 collection centers in the Lendezari range, 34 collection centers in the Nakadongari range and the Tumsar forest range covers 43 collection centers. There are 29 collection centers in the Lakhani range, 54 centers in the Sakoli range, 29 collection centers in the Bhandara range, and 42 centers in the Adyal range. Paoni range has 12 centers divided into three units. In the Lakhandur range, there are 25 centers spread across four units. There are 10 units in the Bhandara division, and 110 villages are permitted to collect tendu patta under Community Forest Rights (CFR).

As per the forest department record, 23,133 families were involved in the tendu patta collection in 2017. In 2018, there were 24,459 families in the collection, and in 2019, there were 27,346 families collected tendu patta.

In 2019, the Bhandara forest division received Rs. 3,91,84,240 as a royalty amount. In 2020, due to Covid, the amount is reduced to Rs. 1,99,88,346. In 2017, the Bhandara division distributed Rs. 15, 01, 52,143 as a bonus to 21,133 families. In 2018, the division distributed a bonus of Rs. 4, 25,15,086 and in 2019, the amount is Rs. 1,06,39,003. In 2020, due to Covid, only 1,889 families collected tendu patta in the division.



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GONDIA FOREST DIVISION

In the Gondia forest division, there are four units in the Gondia range and five units in the Goregaon range. 2 units in the Amgaon range, 6 units in the Salekasa range, 6 units in the North Devari range, and 6 units in the South Devari range. 7 units in Sadak Arjuni's range. There are 7 units in the Chichgad range and 5 units in the Gothangaon range. There are 5 units in Navegaon Bandh. 5 units for Arjuni Morgaon. 4 units in the Tiroda range. Gondia forest division has a total of 62 units.

This division has 618 *phadi*. According to the forest department, CFR is divided into 24 units, each of which includes 426 villages.

In the Gondia forest division, in 2017, 37,831 families were involved in the tendu patta collection. In 2018, 22,522 families while in 2019, 31,887 families were involved in the collection of tendu patta. In 2020, 13,537 families collected tendu patta during the pandemic time.

In this division in 2019, Rs 6,19,85,146 was received as royalty. This year Rs 1,69,70,123 was distributed as a bonus to the 31,831 families. In 2017 Rs 32,69,90,405 was received as royalty to the department. This year Rs 29,13,64,059 was distributed as a bonus to the 37,780 families.

WARDHA FOREST DIVISION

According to forest department records, there are two tendu units in the Ashti range. 2 units in the Talegaon range, 4 units in Karanj, 3 units in the Arvi range, 2 units in the Kharangana range, 3 units in the Hingni range, 2 units in the Samudrapur range and 2 units in the Wardha range. In 2021, in all these units, a total of 205 *phadi* were established to collect the patta.

Even though the Bor Tiger Reserve has been notified, the buffer area is not part of the tiger reserve yet. As a result, the collection centers fall under the jurisdiction of the territorial forest division.

In 2017, 3,341 families participated in the collection of tendu patta. In 2018, 3,353 families were involved, while 3,395 families were involved in 2019. Only 1,889 families were involved in 2020 due to the pandemic time. In the Wardha division, in 2019, a total of Rs. 26,33,770 bonus was distributed to the tendu collectors.

NAGPUR FOREST DIVISION

In the Nagpur Forest division, 14,127 families participated in the collection in 2017. In 2018, there were 15,883 families involved. In 2019, there were 17,924 families involved. In 2020, 14,470 families were involved in the collection.

In 2021, there were four units in the Devalapar forest range, with 26 phadi. There are 5 units and 20 collection centers in the Paoni range. There are 8 units in the Ramtek range, and within these units, there are 53 collection centers. There are three units and nineteen collection centers in the Parshivani forest range. There are four units and 35 collection points in the Khapa range. There are three units and 32 collection points in the Kalmeshwar range. Three units with 30 collection centers are in the Narkhed range. There are two units and thirty collection centers in the Katol range. In Kondhali, there are three units and 33 collection centers. There are three units and 40 collection centers in the Hingna range. Butibori has four units and 55 collection centers. Three units and 34 collection centers are in the north Umred range. There are eight units and 79 collection points in the South Umred range. Nagpur forest division has a total of 507 collections. Under CFR, 3 units and 7 villages are incorporated for patta collection.

In the Nagpur division, in 2017, Rs. 18,87,03,053 was distributed as a bonus to 15883 families. In 2018, the bonus distributed was Rs.6,76,86,368. In 2019, Rs. 2,17,26,107 was given as a bonus to the collectors.



CENTRAL CHANDA FOREST DIVISION

This division is spread over 1,44,922 hectares. In this division, there are 8 forest ranges. In 2020, there were 23 units and 177 collection centers in this division. In the Pombhurna range, there were 5 units and 45 collection centers. 2 units and 21 centers in the Kothari Forest range. In the Dhaba range, there were 4 units and 39 centers. In the Ballarshah range, 4 units and 23 centers. In the Rajura range, there were 3 units and 21 centers. In the Virur forest range, 2 units and 5 centers. In the Vanadasi forest range, there was 1 unit with 15 centers, and in Jivati, 2 units, and 10 centers.

In 2017, more than 10 crores were received as royalty from this division to the department. This year, 12,957 families received a bonus of Rs. 9.5 crores. In 2018, 3.69 crores were received as royalty to the department and 9,424 families received a bonus of Rs. 2.22 crores. In 2019, in this division, Rs. 3,34,00,932 received royalty from the forest department. This year, 11,078 families collected tendu patta and they get Rs. 91 lakhs bonus.



CHANDRAPUR AND BRAMHAPURI FOREST DIVISION

In the Chandrapur forest division, in 2017, a total of 11,200 families were involved in the patta collection. This year Rs. 7.95 crores received royalty to the department. This year Rs. 7.10 crores were distributed as a bonus to these families. In 2018, in this division, Rs. 3.52 crores royalty was received and Rs.2.11 crore was distributed to 10,908 families. In 2019, 13,910 families collected tendu patta and they received Rs. 66,01,911 as a bonus. The Forest department received Rs. 2.41 crores as a royalty.

Considering other divisions in Chandrapur district, the Bramhapuri division fetches maximum tendu patta from the forest. In this division, more than 20,000 families collect tendu patta every year. In 2017, the division received Rs. 14.88 crores as a royalty. This year 23,694 families collected tendu patta from the forest and received an Rs. 13.30 crores bonus. In 2018, Rs. 6.02 crore was received as a royalty, and Rs. 3.62 crores was distributed to 22,279 families. In 2019, Rs. 3.90 crore was received as royalty, and Rs. 1.06 crore was distributed as a bonus to 23,465 families. In intervention with the community, it was found that in the Bramhapuri division, a huge quantity of tendu patta is collected by the villagers. Most of the families are involved in the tendu patta collection. Approximately, a single family earns Rs. 8–15,000 from the patta collection and they also get a bonus extra. Though there is a tremendous economy behind this collection, there is a grey shade in the collection as the forest is degrading and man-animal conflict is also increasing day by day.

RECOMMENDATIONS

The tendu leaves plucking is became an important livelihood source in all landscapes particularly given the absence of employment opportunities during summer. The statistics on tendu leave production in the country shows that around 3.5 lakh tons of leaves are collected every year from the forest in India. Our study team noticed that the harvesting of the leaves is not in sustainable way. The collection pattern is also damaging to the forest and wildlife.

1. In the patta collection small to large size of trees and branches were cut. This destructive practice led to the vanishing of this wild tree species from the forest. There is no data regarding the tendu trees from the protected area as well as the regular forest. So, the forest department should take inventory of this species on priority.
2. The patta collection requires proper silviculture techniques from starting to the end of the season. In pruning, the size of the patta regenerated, from the tress is most important.
3. After post-harvesting, it is noticed that all size of tendu leaves is collected carelessly by the collectors. After sorting the leaves, the young and discarded leaves were thrown which is a huge waste. Every year proper education is compulsory from the contractor to villagers for sustainable collection of patta.
4. Appropriate technology needs to be developed by the Forest Department or Research Institutes for reducing the wastage of leaf cover, and proper storage, handling, and transportation of the leaves.
5. Strict actions should be taken against those contractors who did not follow the rules mentioned in the contract of the unit.
6. Research should be done by the Institutions/ NGOs/ Forest Department / ICFRI/ to develop other alternatives of the tendu leaves for bidi.
7. Forest Right Act was implemented in a few areas to give the local people the power to hold on to local resources for livelihood generation. Does such power really do with their livelihood? Or can tendu leave collection make their life sustainable? Does this harvesting is sustainable? These issues must be studied properly to understand the scenario.

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