

**Impact Assessment of Logging in the Western Ghats of
Karnataka, India.**

Study conducted by:

PRAKRUTI/PSK

BASAVARAJ NILAYA

CHOWKIMATH, SIRSI-581401

UTTARAKANNADA

KARNATAKA

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**WITH THE FINANCIAL SUPPORT FROM THE NETHERLANDS COMMITTEE
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Table of Contents

1.0: Introduction:	3
2.0. Survey on Logging in Western Ghats:	3
2.1: Meetings:	5
2.2: Resolutions of the meeting	5
2.3: Study of Impact Assessment of Logging	6
2.4: Strengthening Communities against logging	7
2.5: Impact	8
2.5.1: Challenges ahead:	9
2.6: Assessing the impact of logging, comparison of density and basal area in disturbed and undisturbed TRF regions.	11
Statistical Analysis	12
Vegetation structure in the undisturbed zone	14
Conclusion and Recommendations:	15

Impact Assessment of Logging in Western Ghats of Karnataka, India.

1.0: Introduction:

The Western Ghats, extending from the north-western tip of Maharashtra to the southern-most tip of Kerala is known the world over for its rich bio diversity and the abundant variety of flora and fauna that flourish in this region.

However, use of forest for agriculture expansion, construction of dams, urban expansion and other development activities is threatening the forest ecology. After the ban on green felling (in 1990) the Karnataka Government started removing of only dead and fallen trees in the forests. Unscientific method of harvesting dead and fallen trees in forest has caused degradation of forest. Several logging sites were visited and impact assessments were made. Media coverage, joint survey with Forest Department, local communities and with media persons was carried out under the project.

2.0. Survey on Logging in Western Ghats:

Objectives:

1. To assess the impact of logging on NTFP and on forest ecology.
2. To reduce the damage on TRF ecology and to create awareness on impact of logging.
3. To bring out the loopholes in the implementation of logging policies and practices
4. To create awareness on the impact of logging in the media.

In this regard we have conducted field visits and study on 78 logging sites in TRF regions of Western Ghats.

Major findings of the study:

- Several new roads were established in order to transport the logs. This is against the logging rule according to Forest Act. The order clearly states that no new roads should be constructed to transport logs.
- Green trees and young saplings were cut to make way for new roads. In some forests area (near Jenumarana Kodlu, Challegadde) for transporting one dead and fallen trees on an average 375 square meters of new road was established. Forests were divided into several compartments and in each compartment logging is carried out once in every alternate years. This division of compartments gives a free hand to the timber contractors to carry out the logging every year in the same forest region, leading to fragmentation of fragile TRF ecosystems.

- Opening up of canopy cover in the tropical forests of the Western Ghats lead to increased soil erosion in the area and silting in the streams.
- Several NTFPs were under threat because of logging and regeneration rate has declined in logging area. According to the result of sample plots drawn in three sites revealed that to cut one dead and fallen tree the contractors have felled on an average 44 green trees (more than 30 cm gbh) and 2500 small regenerating saplings.
- Survey of traditional medicine person also revealed that several medicinal plants are under threat of extinction because of logging.
- Forest fragmentation has led to disturbing habitat and movements of wild animals and causing threat the biodiversity.
- These roads may provide opportunity for illegal harvesting of timber and forest resources, poaching, sand mining and encroachment of forests.
- Soil erosion and forest fire has increased leading to forest degradation.

Activities:

After surveying the logging sites Prakruti/PSK has organised a joint visit with forest officials to some of the forest areas where the extent of deforestation is high. Forest department officers, media and local people participated in this fact-finding mission. Senior forest officers including Conservator of Forests of Canara forest circle and Central vigilance have visited these areas. We strongly recommend them to change the present technique of harvesting trees and establishing roads inside the thick forest to minimise the damage to forest ecology. We also urged them to stop permanent extraction of dead and fallen trees in the crest line of tropical forests to avoid opening up of vegetation cover and to reduce soil erosion. Meetings and discussions with local community were also held to create awareness and to involve them in this conservation of TRF.

Results :

- The issue of deforestation due to logging was brought in to the notice of senior forest officers. They assured to take serious action against those who found guilty in felling green trees.
- A clear message was sent to forest contractors to respect the logging rules while harvesting the timber and in establishing new roads in side thick forests.
- Villagers once who had an opinion that logging is a department's activity and local people can not raise their voice to reduce damage to the forest have now started to get involved in conserving forests. In some villages people organised themselves meetings to over come the problem caused by logging since it is threatening their livelihood.

ACTIVITIES: The following activities were organised as part of the programme to assess impact of logging:

2.1: Meetings:

Venue: Gonsara village, Hulekal Forest Range, Sirsi Forest Division, Canara Circle, Karnataka

The meeting was organised to assess the impact of logging in Gonsara village on 17th December 2003.

The **objectives** of the meeting were to help organise forest dwellers and local community to understand the adverse effects of logging and create awareness on the negative impact of logging. Gonsara is one of the remote villages located near the crest line of Western Ghats in Uttara Kannada district. According to the villagers' logging is being carried out in the adjacent forest area since 1989. The forest is unique and vulnerable because of sand mixed soil and granite terrain underneath. Several new roads were built in order to transport the timber and vast area was deforested. *Prakruti* had carried out research survey in this area and joint field visit was organised with the senior officials of the Forest Department including Deputy Conservator of Forests and they had assured to avoid further damage to the forest ecology due to logging.

Shannu Gowda, village head man of *Khare Vokkaliga* Community said that '*Maraviddare Navu Ulidevu*' meaning human beings could survive only with the existence of trees. He further said that due to logging the forest is totally degraded and they are ready to face any hardship to conserve the existing forest.

Venkatramana Hegde a traditional herbal medicine man said that there are several medicinal plants in this forest which are under threat of extinction due to logging. Another representative of *Khare Vokkaliga* community Bomma Gowda said that the forest was so thick that people were not able to enter it before logging. But now it was degraded to such an extent that vehicles could go to the very interior places in the forest.

The purpose of the meeting and the findings of the study regarding impact of logging on NTFP and forest ecology were explained to the community representatives.

The hazards of soil erosion, decreased infiltration rate of ground water, impact on NTFP, decreased fuel wood availability were discussed in detail. Participants' feel that it is very essential to conserve the remaining forest and were ready to launch struggle to save the TRP.

2.2: Resolutions of the meeting

After detailed discussion the Community Representatives passed the following resolutions.

It was decided to submit a memorandum to the Forest Department with following issues.

1. This forest is vulnerable and because of the presence of the granite and sandy soil it is difficult to re-establish the forest if cleared.
2. Considering the above factors, the senior officers of Forest Department should visit the site to see the extent of deforestation and its impact on local ecology.
3. The logging activity must be stopped before 21st December 2003 and this ban should be imposed until the issue of removal of dead / fallen trees be solved.

The villagers formed a local village level organisation 'Gonsar Grama Aranya Samrakshana Samiti' to fight against the logging activity. They also warned the Forest Department that if they fail to address the issues within mentioned date the 'Samiti' would launch struggle against logging. About 25 people attended the meeting. The people were labourers, small landowners or forest dwellers and indigenous people. The houses are scattered and there is hardly any communication facilities, which makes it difficult to organise the people.

2.3: Study of Impact Assessment of Logging.

2.3.1: Sites: Jaddigadde, Aitaalmane, Dhoolalli,

Forest Range: Hulekal,

Forest Division: Sirsi, Canara circle, Karnataka.

The above sites are located in the crest line of Western Ghats with pristine tropical forest. The forest is unique because the Wet Evergreen forests belts contain palm species *and Dalbergia sisso* *and Tectona grandis* species, which normally occur in deciduous forest.

Several new roads were built inside the forest to transport the timber. Extent of damage is very high along the main road from Jaddigadde to Aitaalmane. Green trees and young saplings were cut down during construction of the road and dragging the timber. Cane, honey, *Garcinia gummi-gatta*, *Garcinia indica*, *Acasia concinna* are the major NTFP species found adjacent to these roads. Several cane plants were cut down and found lying along the roadside.

Forest area-surrounding Dhoolalli and Jaddigadde were also surveyed. Logging has been done in the hilly region and in very steep locations. This would lead soil erosion and further sloping in downstream.

The local Forest Department staff were claiming that many of these roads existed earlier and they have repaired it., so as to transport the logs. However, field visits (appearance of cutting of green trees and saplings, remains of stumps of these trees and saplings and discussion with the local people) revealed that these roads were established very recently and only to transport the timber. This is in violation of the rule of Forest Department.

The settlements are scattered, as the village is in the remote region. Prakruti team met several local people and farmers and discussed about negative impact of logging and possibilities and

methods to halt the logging. Villagers explained their unwillingness to undertake any agitation against logging because they fear from harassment by Forest Department staff. It would take time to organise the local people and several field visits may be required to halt the unscientific method of harvesting and transporting the timber by logging.

2.3.2: Sites- Chipgeri

Forest Range: Manchikeri

Forest Division: Yellapur

Date of Visit: 31st March 2004

We visited logging areas in the forests of Jakkalli near Chipgeri. We met Bhugudimae Hegde as well Ramesh Bhat from Jakkolli. They said that the Forest Department is felling only dead, fallen trees. However, there is extensive smuggling of timber, especially rosewood and teak. These are smuggled out from Islur route to Sirsi and from Katur to Mundgod. This illegal smuggling is going on since last 5 years. The department does not take any actions. The staffs like Watchman, Guard and forester stays 15 kms away at Manchikeri. This makes it easier for poachers to intensify their activities.

Before Chipgeri, extensive removal of teak poles were observed and checked by us. In many cases there were no mark by KFD. In some cases there was only mark by yellow chalk. This raises doubts about the 'thinning' of teak plantations. It looks as if illegal removal/ cutting of teak poles have become a common practice by KFD.

We walked extensively in teak plantations as well as natural forests where dead/ dry timber was removed. Our observations are:

- Only dead and dry trees are removed and KFD is keeping eye on this.
- However, many rosewood lots of fuel wood was left in forest. What is the purpose? Needs to be checked.
- Illegal 'thinning' removal of teak poles from teak plantations.
- Extensive fire to natural forests leading to adverse impact on regeneration of species.

2.4: Strengthening Communities against logging

On 22nd December 2003, about 9 a.m. 30 villagers arrived in the midst of thick forest surrounding Gonsar village. They asked timber slivers to stop their work. They had already appealed to senior Forest Officers to avoid the unscientific method of harvesting the timber by logging. Villagers requested them to visit the site and to see the extent of damage done to the forest by logging

activity. However, only Range Forest Officer had visited the site. After stopping logging activity they discussed about the steps to be taken further. Finally the villagers decided to put following demands to the Forest Officers/ Department:

1. All the existing roads in the forest should be closed immediately by digging trench and fencing it. This would stop illegal removal of timber.
2. Forest Department should grow plants in this degraded forestland and on the roads made inside the forest, and the species should be of NTFP and medicinal plants.
3. Logging be done once in ten years in this forest region and should be completed within one year. This time limit should be strictly adhered.
4. While harvesting and transporting the timber, proper technique should be adopted to check damage to the forest ecology.

In the afternoon Assistant Conservator of Forests, Range Forest Officers and other Forest Department staff visited the site. Villagers and member of *Gonsar Gram Aranya Samrakshana Samiti* urged the officials to fulfil the earlier mentioned demands. The officers also agreed that damage has occurred to the forest and several new roads were formed within the forest to transport the timber. Earlier the forest officials said that they would start digging trench and fencing the existing road in the forest only during monsoon. However, villagers said that these works has to be done at the earliest and until this work have completed they will not allow any logging activity and to the transport the timber will not be allowed.

With the strong opposition and considering the extent of damage to the forest, the forest officials agreed to fulfil the villagers' demand. They assured that closing of the existing road in the forest by digging trench and fencing would start within two days and planting of NTFP and medicinal species will be done during monsoon. They also assured to carry out logging activity in the same forest area once in ten days. To bring the transparency in the work they assured to give details of working plan, map of forest area, different blocks and compartments in the forest survey numbers. Forest officials said that proper vigilance will be kept to avoid any more damage to the forest while harvesting and transporting the timber and asked villagers to co operate in this regard and to help in reducing the damage thorough constant monitoring the logging activity. Prakruti team members were present in the discussion and helped to organise people and to give proper awareness against impact of logging prior to all these meetings and discussions. Villagers told that if the Forest Department fails to fulfil the assurances the agitation would be continued.

2.5: Impact

1. Due to the agitation in Gonsar, Forest contractors and officials were forced to visit the logging site.

2. The roads in the dense forest established for transportation of logs have been closed. Trenches were laid and roads are fenced for this purpose in Gonsar region.
3. This year no road was constructed in the forest to transport the timber. The timbers were transported up to main road using the buffaloes and other means.
4. Logging has been avoided in the dense forest area from where transportation of logs would have lead to fragmentation of natural forest.
5. In other regions Forest officials especially Range Forest Officers and Assistant Conservator of Forests are taking more precaution to minimise the damage while harvesting the timber.
6. Community is actively participating in Forest Conservation activities influencing policy and implementation.

2.5.1: Challenges ahead:

1. Continuous monitoring may be necessary to insist sustainable ways of logging in future.
2. As promised earlier, Forest Department did not initiate afforestation programme in the forest areas.
3. Carrying this message and experience to other logging sites in the Western Ghats, spreading the message.

Report on impact assessment of logging prepared by college students as part of training youth on environmental issues.

To create awareness on environmental issues and to make them understand about importance of forest training program was initialed to college students. Students of MES Arts and Science College Sirsi were selected for this purpose. The report produced by the students after fieldwork is presented as bellow.

Introduction:

Unscientific logging in the Western Ghats forest region of Uttara Kannada is one of the major causes for the degradation of forest. Gonsar is one such area where logging is being carried out since last 15 years. First group consisted of 27 students visited 12 houses in Gonsar village collected data after interviewing several men and women.

2. Because of logging, numerous roads were constructed in the dense forest. Several green trees, plants and young saplings were also destroyed due to this. In fact the villagers had requested local foresters and secretary of logging contractor to stop the logging considering the fact that it would destroy the natural forest. However, Their request since last five years did not materialize to stop indiscriminate logging. Members of Prakruti/ PSK have visited several times to the surrounding forest region and carried out study to assess impact of logging. They had also tried to motivate the people to check the logging and to use proper method to harvest dead and fallen trees. Houses in the village are scattered and located in a hilly region therefore it was not easier to communicate and organize the people. More over several houses had belonged to poor forest dwelling community. They had the opinion that the Forest Department has all the right to do logging in whatever manner and by opposing them or refusing them to practice in sustainable manners the Forest Department staff may start harassing them.

Impact on NTFP

Garcinia gummigatta, Garcinia indica, Cinnamomum zeylanicum, Myristica malabarica, Terminalia chebula, Phyllanthus emblica and honey are the major NTFPs available in the forest. Due to continuous logging these resources are getting degraded. Availability of many of these products is decreasing mainly because of logging. However, some spices are also degrading because they are being over exploited. The damage is caused because of construction roads and while harvesting the logs. Apart from domestic requirement and financial benefit through marketing of the NTFPs, several products were also of cultural importance. Spices like cane, bamboo, and several timber species have provided raw materials to village artisans. Medicinal plants are also degrading which has its implication on traditional herbal medicine persons and traditional birth attendants. Apatina chekke and Chakrani beru (botanical name unknown for both species), which are once, analyze abundantly. Near Kirgodigadde and Hosalli forests, have now become rare.

Impact on agriculture:

Paddy is the major crop grown in the village. Arecanut, Cardamom, Pepper, Coconut and recently Vanilla are the other major important crops. Due to less rainfall and forest degradation the water availability is reduced. Paddy being more water-intensive crop has had adverse impact due to this. Villagers used to grow hundreds of indigenous variety of paddy earlier. These traditional paddy varieties are very long duration (six to six and half months of growing period) and hence require more water. Now the farmers are either growing high yielding paddy varieties with short growing period or they have stopped growing paddy. Now the land use has been changed as one could see acacia plantations in some of the upland paddy fields. The monoculture plantations have resulted in drying of water springs leading to adverse impact on agriculture.

With all these problems villagers started agitation against indiscriminate logging in Gonsar village. These informations were collected conducting interviews in each household in village. Shri Narasimha Hegde, Prakruti and Shri Rajendra, Geography lecturer guided the students.

Second Group:

The second group consisted of 27 students who went to the forest to understand the impact of logging. Mr. Parameshwar Hegde, Mr. Venkatramana Hegde and V.N. Hegde are farmers. Sarva Gowda, traditional herbal medicine man and Mr. Ramesh Hegde President of local Youth Club were present throughout the study. Mr. Dayananda Bhat, Principal of college guided the team.

Figure 1: Villagers and PSK members inspecting the Illegal cutting of valuable teak tree.



Figure 2: Logging in the tropical rain forest Causing threat to the ecosystem.



2.6: Assessing the impact of logging, comparison of density and basal area in disturbed and undisturbed TRF regions.

Introduction:

Western Ghats region of Karnataka covers an area of about 20,000 sq. meters and it has most dense forests in the country. The tropical wet evergreen forest covers 15% (544020 ha) of the region, represent the most luxuriant type of vegetation that can be seen along the Western Ghats belts. Out of which, only about 10% of the forest can be classified as closed forests with more than 80% canopy cover.

Very little has been documented about the status of the forest cover, except that it seems to have obtained between 1972 and 1985 at a rate paralleling that for India as a whole, which implies a loss of over 24% annually. If we extrapolate from 19856 to 1989 this means a total loss of almost for 1972 to 1989. According to Myers et, al 2000, only 6.8% of the original extent of vegetation exist today. Still worse is the decline of the primary forest: the amount remaining seems to be no more than 8000 square kilometers. Some of the major causes for greater concern of the Western Ghats are as follows.

- Extinction of some of the species of flora and fauna, nearly about 586 species are in red data list.
- Loss of valuable forest areas due to various developmental projects and indiscriminate felling for commercial timber.
- Land degradation due to mining and no afforestation.
- Large-scale transformation of forest cover plantation and extension of agricultural crops through encroachments.
- Illegal felling and logging in the thick forests.

Uttara Kannada district is located in midst of forests of Northern part of Western Ghats of Karnataka, embrace 80% of forest cover (8,271 square kilometers) out of its total geographical area of about 10291 sq.kms (Prajapati, 1997)

Logging is one of the major issues of concern because of the intensity of damage caused to the natural forest by the way of damage to regeneration, roads made to transport timber and other activities. Many authors have studied the damage causes due to logging in the different parts of the world. Fair-weather, 1997 has found that removal of about 85 of the remaining basal area in 76 years old red maple/ Blavle Chery stand.

Maliro et. al, 2002, found forested areas have significantly tighter species richness and abundance than deforested sites, on the other than deforested sites had significantly higher Stanton Indices of diversity and evenness.

With this background the study was carried out with the following objectives.

1. To know the diversity pattern in logged and unlogged area.
2. To assess quantity the magnitude of disturbance based on the species density abundance, richness and diversity in disturbed and undisturbed areas.

Material and Method

This study was carried out in evergreen forest, which was subjected to logging continuously the unlogged forest was taken as control for comparison.

Estimation of Sampling

To lay the sample plot stratified random sampling method was adopted. The sampling plot of size 20mX 20m, were laid, at each sampling plot the plat measuring more than 30 cm GBH were considered as trees and there height and GBH were recorded. For regeneration studies 1mX1m sub plots were laid with four corner and center of the main plot and regenerating species and their number was recorded.

Statistical Analysis

The data recorded in the field were subjected to statistical analysis to know the structure and composition of forest in clear.

Importance Value Index (IVI)

Data collected was analyzed as suggested by Curtir and Macintosh (1950) and accordingly relative density, relative frequency and relative dominance, were assessed to obtain importance value index for each species in a sample (zone) finally IVI was assessed for each vegetation i.e. disturbed and undisturbed.

IVI (for tree stroke)= Relative frequency + Relative density + Relative dominance.

IVI (for regeneration) = frequency value for a species + Relative density

$$\text{Relative frequency} = \frac{\text{Frequency value for a species}}{\text{Total frequency value of all spp}} \times 100$$

$$\text{Frequency} = \frac{\text{Number of quadrates in with a spp occur}}{\text{Total number of quadrates sampled}} \times 100$$

$$\text{Relative density} = \frac{\text{Number of individuals of spp}}{\text{Total number of individuals of all spp}} \times 100$$

$$\text{Relative dominance's} = \frac{\text{Total basal area of spp A}}{\text{Total basal area of all spp}} \times 100$$

Density:

The total number of plants at each disturbance level was assessed in the form of total number of stems of shrubs of seedlings per hectare.

Total Basal Area.

This corresponds to the sum of the areas of the cross section of trees measured at GBH. Only tree with girth more than 30 cm has been considered. The basal area was calculated for all plots as well as separately, for each disturbance type. Basal area of trees at GBH was calculated by using the formula (Chaturvedi and Khanna, 1982)

$$\text{Basal area } BA = \frac{g^2}{4\Lambda}$$

Where BA = Basal area in m²

g = girth of breast height (m)

Result and Discussion

The structural study was carried out in each disturbed zone and the results are presented below.

Vegetation structure in disturbed zone

The entire area is being severely disturbed feature of the vegetation in the zone are presented in the Table -1. The results showed that the zone endowed with 20 tree species. The density of tree species ranged from 0.463 to 18.15 tree/ha, as against the total density of 11.189 tree /Ha. The highest density of 18.05 trees/ha was recorded for *Hopea ponga*. Among the NTFP species *Cinnamomum macrocarpum* had the highest density of 7.87 tree/Ha.

The basal area of a species ranged from 0.007 to 0.785 m²/Ha, as against the total basal area of 15.23m²/ha. One of the important NTFP species *Garcinia indica* had a basal area of 0.050m²/ ha.

The frequency percentage of species ranged from 4.167 to 58.333 percent. Among NTFP species *Cinnamomum macrocarpum* was most frequent with 41.667% followed by *Artocarpus hirsutus* 12.5%.

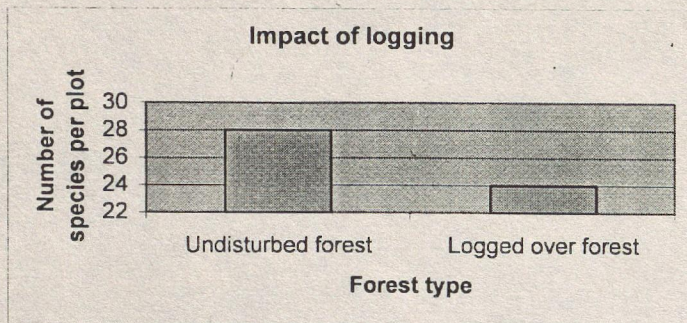


Figure 3: Number of species in the undisturbed forest patch and in logged forest.

Sample plots of twenty meters by twenty meters was laid in different forest regions for the study. It is observed that there is decrease in the number of species in the logged forests. In the undisturbed forest twenty-eight species were present where as in the logged forest only twenty-four species were recorded.

Vegetation structure in the undisturbed zone

The zone covered dense evergreen forest with high species diversity. The structural features of the vegetation are presented in the Table-2. The results show that the zone comprises of 28 tree species indicating more diversity than the disturber zone. The density of a tree species longed from 0.463 to 40.74 trees/ha. The highest density (40.74 trees/ha) was recorded for *Knema spp.* Among all NTFP species *Garcinia gummi-gatta* had highest density of 21.759 trees/ha. And *Terminalia bellarica* has the lowest density of 1.389 trees/ha. The basal area of a species rouged from 0.021 to 4.6m²/ha, as against the total basal area of 15.825 m²/ha. Among NTFP species *Garcinia gummigatta* recorded the highest basal area of 1.5m²/ha.

The frequency percent of a species rouged from 4.16m²/ha to 87.5 percent. *Knema spp* was found most frequent. *Garcinia gummigatta* was most frequently found NTFP species with a frequency value of 62.5 percent.

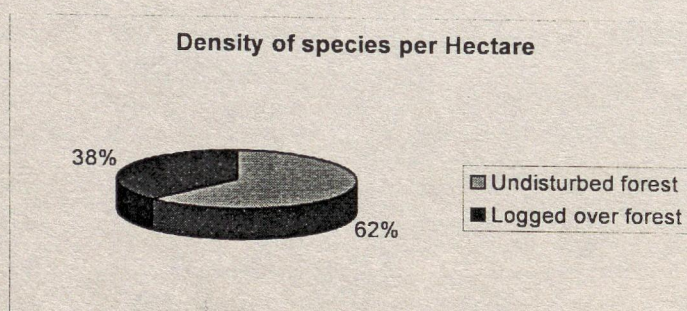


Figure 4: Density of species per hectare in the disturbed and undisturbed forest region.

Finally, the vegetation structures characteristics including Shannon diversity. Simpson's index of demimonde tree species richness, basal area and density was compared among the two disturbance zones. The results revealed that the highest Shannon diversity (3.84), species richness (28 species) and density (192.128 trees/ha) was recorded in the undisturbed zone (Table -3).

Status and pattern of regeneration

Status of regeneration in disturbed zone

The status of saplings and pole strata in the zone is presented in the table 4. The result revealed the existence of 14 species in the strata with the total density of 604.17 stems/ha. The highest density of 150 stems /ha was recorded for *Hopea ponga*. The important NTFP species that were regenerating are *Cinnamomum macrocarpum* (density 50 stems/ha), *Garcinia indica* (12.5 stems/ha) and *Piper nigrum* (4.17 stems/ha). Among the NTFP species the highest density, frequency and IVI was recorded for *Cinnamomum macrocarpum*.

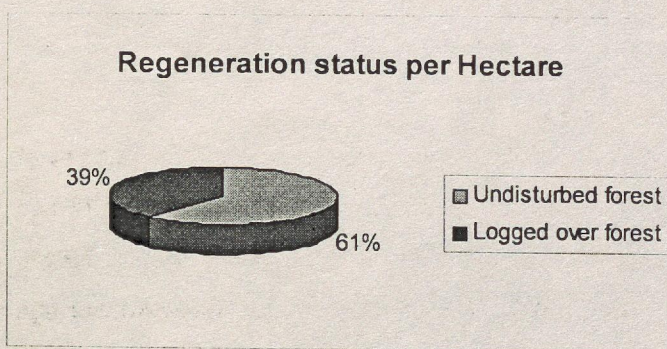


Figure 5: Regeneration status in the disturbed and undisturbed forest region.

Status of regeneration in undisturbed zone

Status of saplings and poles strata is presented in the table -5. The result shows the existence of 29 species in the strata with the total density of 616.56 stems/ha. The highest density (120.81 stems /ha). Frequency (45.83%) was recorded for *Hopea ponga*. The important NTFP species that were regenerating are *Garcinia gummigatta*, *Syzygium jambos*, *Cinnamomum macrocarpum*, *Artocarpus hisrutus*, *Artocarpus lakoocha*, *Garcinia tolbotti* and *Piper longum*. Among the NTFP species *Garcinia gummigatta* had the highest density (58.32 stems /ha) frequency (33.33%) and IVI (5.36%)

Conclusion and Recommendations:

Forests are the most sensitive and fragile ecosystems. A slight disturbance, may be in the form of logging, lopping of green trees, removal of heavy amount of leaf litter pruning of branches of trees like in 'Betta lands' will cause a great variation in terms of species comparison, richness diversity and density of a species. In the present study, which was carried out to know the effect

of logging on forest structure and regeneration pattern. The results clearly indicate that the unlogged area, which is considered as undisturbed patch, has good regeneration pattern and structure compared to logged patch.

Implementing scientific logging methods, reducing the forest loss can help improve the situation. We have conducted several awareness meetings in the forest region telling the necessity of implementing reduced impact of logging. Published book on logging with details on logging rules study results on impact assessment of logging in the tropical forests.

The local forest staff, contractors and timber harvesters should be trained properly for scientific removal of dead fallen trees.

Local communities, Village Forest Committees and community organizations should be involved for sustainable harvesting of the timber.

Emphasis shall be given to Non Timber Forest Products that will cause no or less damage to the forest ecology compared to harvesting of timber.

Constant monitoring and proper management of the forest during and after logging is very essential.

The policy of extraction of dead and fallen trees in the forests of Western Ghats is causing extensive damage to the natural forests. The study has confirmed that in order to remove one dead tree a large number of live trees (above 30 cms girth) and regenerating plants are destroyed. About 35 percent of the area are clear felled for road construction. Opening up of the canopy may cause changes in the nature of the forests leading to decrease in the biodiversity and affecting the soil. The timber extracted in this region has long term negative affects on the ecology of the region.

Extraction should be stopped immediately to preserve remaining small patch of natural forests.

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Annex 1: Logging sites, Practice and Impact of logging, actions taken by us along with local communities.

Region	Practice	Impact	Action
Forest Division: Sirsi Forest Range: Janmane Village: Asabale, Hallibail	<ul style="list-style-type: none"> - Establishing Roads to drag the logs - Clear cutting of small plants where the roads are established. - Large number of NTFP spices was damaged during logging activity. 	<p>Opens the dense forest area for outsiders and smugglers.</p> <p>Large numbers of NTFP spices plants were damaged during dragging the logs.</p> <p>Roads are established into the thick forest, threaten wildlife and valuable forest resources.</p>	Discussed with Range Forest Officer, about logging activity and construction of road. He assured to check the ground reality and take further action.
Forest Division: Sirsi Forest Range Janmane Place: Bandal	Trees are marked but cutting is not started.	The tropical rain forest will be damaged. The valuable NTFPs like <i>Garcinia gummigatta</i> , <i>Garcinia indica</i> , <i>Myristica malabarica</i> , <i>M dactyloides</i> <i>Artocarpus lakoocha</i> and cane were found in this region.	Discussed the issue with VFC and NTFP harvesters. Organized meeting with local youth club.
Forest Division: Sirsi Forest Range: Janmane Place: Mosalegundi (Koorse)	Logging was done in October 2003. Roads were established for transporting logs.	Large numbers of small plants were clearly cut down for making roads. <i>Garcinia gummigatta</i> is the Main NTFP, found in large number in this region was damaged.	Discussed the issue with VFC and NTFP harvesters. Media coverage done considering the extent of damage.

Forest Division: Honnavar Forest Range: Manki Place: Hinnoor	Trees were cut down but not taken away.	At the time of carrying the logs the road must be done. <i>Garcinia india</i> is the main NTFP in this region was damaged. It can open way for smugglers to smuggle naturally grown teak trees.	
Forest Division: Honnavar Forest Range: Manki Place: Balemath, Adukala, Magod	Marking of dead trees has been done.	<i>Garcinia indica</i> , <i>Artocarpus lakoocha</i> and other NTFPs found in this region.	Discuss with Range Forest Officer about logging activities and to minimize the damage to forest.
Forest Division: Honnavar Forest Range: Hiregutti Logging Place: Mabagi	Cutting of <i>Acacia auriculiformis</i> trees only. No roads were constructed inside the forest.	The <i>Acacia auriculiformis</i> was grown in Plantation. No damage to Natural forest.	
Forest Division: Karwar Forest Range: Ankola Logging Place: Dongri.	Cutting of dead and fallen trees. Old roads were re established to drag the logs.	Large number of small plants was damaged. NTFPs like <i>Garcinia indica</i> , <i>Artocarpus lakoocha</i> , Honey, Cinnamon and other species were threatened. Constructed roads were helped smugglers to smuggle the valuable trees. Wild animals lost their habitat.	Awareness to NTFP harvesters about the damage to NTFP species during logging and motivated them to discuss with VFCs and other community organisations to reduce the problem.
Forest Division: Karwar Forest Range: Ramanaguli Logging place: Halavalli	150 dead trees were cut down. Old roads were renewed for drag the timber. Few small trees were damaged at the time of transportation of logs.	NTFP species were damaged during logging activity. Availability of NTFPs is decreased. Threat to wildlife.	Meetings with the local groups. Motivating them to work with the Forest Department and Logging contractors to follow scientific logging methods.

Forest Division: Karwar Forest Range: Ramanaguli Logging area: Kodlagadde	-Old roads are re established to drag the logs. - No green trees were cut down	Construction of roads leads to smuggling and encroachments. Problem for regeneration species in the forest. Fuel wood problem for local people.	No action taken by Forest Department or local People.
Forest Division: Karwar Forest Range: Mastikatta Logging area: Moodlgadde Village: Sunksal	Logging is not started. Only marking to dead and fallen trees has been completed when the visit was made	No damage done to natural forests	
Forest Division: Yellapur Forest Range: Yellapur Place: Lalguli, Girigiribetta Hanumanthkote	Smugglers cut down thousands of teak trees.	The valuable teak trees were smuggled by smugglers. Forest Department took meek action against them.	Visited the place with local peoples. Vast media coverage. Letter to CCF vigilance. Vigilance team visited the spot and actions were taken against the guilty.
Forest Division: Yellapur Forest Range: Manchikeri Place: Chipageri	Smuggling of valuable teak rosewood Trees. Thinning of teak plantation.	Smuggling of teak and rosewood timber continuously.	Visited the forest area with local people. Informing the higher Forest officer to take necessary action.

Forest Division: Sirsi. Forest Range: Hulekal and Sirsi	Smuggling of sandal wood trees	Several hundreds of young trees were looted	Awareness in the village, media coverage. Villagers and Forest Department caught several thieves and actions were taken.
Forest Division : <i>SIRSI</i> Forest Range : <i>Hulekal</i> Logging area : <i>Halligadde, Hallibailu, Kopparagadde</i> Village : <i>Gonsar</i>	-Establishing new roads in order to drag the logs. -Cutting of green trees for making new road.	-Opens the area to outsiders and smugglers to the remote and thick forest. -Increased soil erosion. -Sand mining along the banks of small tributaries. -Heightened the possibility of encroachment for agriculture.	Visit to the area along with local people. Making aware among them about the impact of logging. Bringing attention of local forest officers.
Forest Division : <i>Yellapur</i> Forest Range : <i>Manchikeri</i> Logging area : <i>Chunchigadde, Totagadde, Nagarjaddi</i> Village : <i>Kampli, Manchikeri</i>	-Establishing new road to drag the logs.	-Cutting of green trees and plants in order to make the road. -Mining activity (mining of Phyllite and Graywack) started within the thick forest area. Destruction of forest cause danger to NTFPs like <i>Artocarpus lakoocha</i> , <i>Acacia concinna</i> , <i>Garcinia indica</i> , Soap Berry, Honey and other NTFPs.	-Discussion with the local people and forest officers about the issue.

<p>Forest Division : <i>Sirsi</i> Forest Range : <i>Hulekal</i> Logging area : <i>Shirguni, Shirasgaon</i> Village : <i>Kakkalli, Dhoranagiri</i></p>	<p>-Felling of green trees in evergreen forest. (Even in the area called as 'Kattale Kanu' since the time unknown meaning dark forest -a primeval tropical evergreen forest)</p>	<p>Destruction of forest. Reduction in availability of canes, <i>Garcinia gummigutta</i>, <i>Garcinia indica</i>, <i>Myristica malbarica</i>, Honey, <i>Vateria indica</i>, <i>Cinnamomum zeylanicum</i>, <i>Cinnamomum macrocarpum</i> and medicinal plants especially <i>Ashoka</i> trees (<i>Saraca indica</i>).</p>	<p>-Visit to the logging area with villagers. -A follow up visits to the forest with Range Forest Officer.</p>
<p>Forest Division: <i>Yellapur</i> Forest Range: <i>Idagundi</i> Logging area: <i>Analgar, Soolgar, Tondekeri, Gummijadi, Magod.</i></p>	<p>-New roads are established in various parts of the forest of deciduous to evergreen type. -Green trees are felled in the forest for making roads and while cutting the logs.</p>	<p>-A permanent road is established that connects <i>Jodahalla to Analgar</i> cross road. Since the villages were located in the midst of the forest, here there was no road up to the village until the logging operation was done.</p>	<p>-Meetings with the local groups interested in conservation of the forest.</p>
<p>Forest Division: <i>Sirsi</i> Forest Range: <i>Kyadgi</i> Logging area: <i>Kalooru, Kattekai Golikai, Soolagal</i></p>	<p>-Making roads in the forest to drag the timber.</p>	<p>-Threat to several NTFPs and its dependent communities due to gradual decline in the forest cover. -Permanent access of forest resources to outsiders.</p>	<p>Meetings with the local groups interested in conservation of the forest.</p>

<p>Forest Division : Sirsi Forest range : <i>Hulekal</i> Logging area: <i>Oudhala</i></p>	<p>Felling of green trees, establishing new roads.</p>	<p>Destruction of forest, decline in availability of several NTFPs and cane, thus creating problem to forest dependent communities like <i>Marathis and Khare Vokkals</i>.</p>	<p>Meeting with local people</p>
<p>Forest division: <i>Haliyal</i> Forest Range: <i>Barchi</i> Villages: <i>Barchi,</i> <i>Singatageri.</i></p>	<p>Felling of green trees violating the logging rule. Illegal felling of valuable teak trees.</p>	<p>-Wide opening of forest area -Destruction of valuable teak spices.</p>	<p>-Visit to the forest with villagers -On the spot check of logging spot -Visit region by press persons -Extensive press coverage -Joint visit by conservator of forest and change in policy</p>
<p>Forest division: <i>Sirsi</i> Forest Range: <i>Banavasi.</i> Villages: <i>Sahasralli,</i> <i>Hosagadde.</i></p>	<p>-Illegal felling of Rosewood trees -Illegal felling of sandalwood trees</p>	<p>-Extensive smuggling of Rosewood trees -Rosewood as a spices has become endangered in this region -Local people are blamed for smuggling</p>	<p>-Awareness among villagers -Joint survey with villagers -Joint visit by forest officers and press/journalist -Wide coverage in press</p>
<p>Forest Division: <i>Karwar</i> Forest Range: <i>Mastikatte</i> Logging area: <i>Heggarni</i></p>	<p>Making new roads in the forest area</p>	<p>Threat to NTFP species like <i>Garcinia indica,</i> <i>Artocarpus lakoocha,</i> <i>Terminalia chebula,</i> <i>Terminalia bellerica</i> and honey.</p>	<p>Only field visits along with villagers, no action yet.</p>

Forest Division: <i>Honnavar</i> Forest Range: <i>Hiregutti</i> Logging area: <i>Keshavalli,</i> <i>Matani, Karikal</i>	Making new roads in order to drag the timber from the forest.	Degradation of forest. Threat to NTFP species and wild life.	No action taken. Discussed during the VFC/FDA meeting in Honavar.
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Annex 2: List of other logging sites visited.

Sl. No.	Name of the Village / area	Forest Range	Forest Division
1.	Hallibail	Janmane	Sirsi
2	Bandal	Janmane	Sirsi
3	Mallikai	Hulekal	Sirsi
4	Halligadde, Hosalli	Hulekal	Sirsi
5	Moornalegadde	Hulekal	Sirsi
6	Hallibail Kirgodigadde	Hulekal	Sirsi
7	Shigehalli	Hulekal	Sirsi
8	Kodegadde	Janmane	Sirsi
9	Naigar	Hulekal	Sirsi
10	Hasanagi	Hulekal	Sirsi
11	Teppagi	Hulekal	Sirsi
12	Sahsralli	Banavasi	Sirsi
14	Hosgadde	Banavasi	Sirsi
15	Mosalegundi	Janmane	Sirsi
16	Hinnoor	Manki	Honnavar
17	Balemath	Manki	Honnavar
18	Adukala	Manki	Honnavar
19	Mabagi	Hiregutti	Honnavar
20	Tagatageri	Hiregutti	Honnavar
21	Gundabal	Hiregutti	Honnavar
22	Reshavalli	Hiregutti	Honnavar
23	Kondalli	Hiregutti	Honnavar
24	Navalase	Hiregutti	Honnavar
25	Matagi	Hiregutti	Honnavar
26	Karikal	Hiregutti	Honnavar
27	Kolimanjaguni	Hiregutti	Honnavar
28	Kolape	Honnavar	Honnavar
29	Mullakkibilla	Honnavar	Honnavar
30	Pillikumbri	Honnavar	Honnavar
31	Bidnakoda	Honnavar	Honnavar
32	Brammuru	Hiregutti	Honnavar
33	Naguru	Hiregutti	Honnavar
34	Vaidya heggar	Ramanaguli	Karwar
35	Halavalli	Ramanaguli	Karwar
36	Heggarmakki Gadde	Masthikatta	Karwar
37	Heggarani	Masthikatta	Karwar
38	Dongri	Ankola	Karwar
39	Halavalli	Ramanguli	Karwar

40	Kodlagadde	Ramanaguli	Karwar
41	Moodlagadde	Mastikatta	Karwar
42	Dehalli	Yellapur	Yellapur
43	Chipageri	Manchikeri	Yellapur
44	Lalguli	Yellapur	Yellapur
45	Kannigeri	Yellapur	Yellapur
46	Tumbebeedu	Manchikeri	Yellapur
47	Girgire gudde	Yellapur	Yellapur
48	Barchi	Barchi	Haliyal
49	Kirgodigadde	Hulekal	Sirsi
50	Supa Dam Site	Joida	Wildlife Dandeli