SUBMITTED TO ECOLOGICAL & ECONOMIC RESEARCH NETWORK (EERN)

VASUNDHARA
democratizing natural resource governance

ECOLOGICAL,INSTITUTIONAL ASSESMENT OF COMMUNITY FOREST MANAGEMENT/JOINT FOREST MANAGEMENT /SOCIAL FORESTRY PLANTATION SYSTEMS IN ODISHA

CASE STUDY

WITH SPECIAL FOCUS ON PARTICIPATORY VEGETATION MONITORING AND NTFP YIELD MONITORING

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March, 2001

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Ecological, Institutional Assessment of community forest management /joint forest management /Social forestry plantation systems in Orissa

- : Case studies:-

(With special focus on Participatory Vegetation Monitoring and NTFP yield monitoring)

By

Mr. Pravat C. Sutar

(March 2001)

Submitted to
Ecological and Economic Research Network (EERN)
Submitted by

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*(*please note that vernacular names have been used in the text. Their corresponding scientific names may be referred from the annexure)*

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I feel deeply pleasured with the encouragement, assistance of following persons / villagers without their help the study report could have taken the present shape.

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Villages	***Villagers***
Gadabanikilo	: *Magi Parida, Nakula Parida, Suresh Chandra Paikray, Arjuna Parida, Ravindra Ku Parida, Brahmadhari Parida, Harihar Martha, Subhendu Parida, Dharmananda Parid and Madhab Chandra Jena*
Karadapal	: *Dibakar, Binen, Bhagi, Sadhu, Shri Sushil Chandra Sahanya, Rushi babu, Ayiban, Pargana,*
Suruguda	: *Late Satya Kisan, Shri Khiradhar kisan, Parsuram Kalo, Kumar Majhi,*
Baghamunda	: *Shri Alekh Nayak, Shri Tikeshwar Nayak, Shri Maheswar Nayak, Shri Kunia Nayak, Shri Vedavyash*

		Nayak, Shri Sunil Patta, Shri Ghanashyam Nayak, Shri Ranjit Sahoo, Smt. Sumitra Pradhan, Smr. Majulata Nayak, Smt. Kumari Bhai, Smt. Padma Patta, Smt. Kandhei Nayak, Shri Arjuna Sahoo, Shri. Khirod Nayak, Shri, Jaswant Patta, Shri. Nityananda Patta, Shri Tikeshwar Behera, Kumari Indira Nayak, Kumri Bharati Nayak, Kumari Subashini Sahoo, Kumri Basumati Pradhan, Shri Durjyodhan Nayak
Talbahali	:	Karmu Nayak, Harekrushna Kalo, Ugrasen Luhura, Jagadish Dehury.

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BANANI Members	:	Dhananja Pattanayak, Subrat Pattanayak
Mahulapalli Yuvak Sangh	:	Shri Sushant Pattanayak
Zilla Jungle Munch, Deogarh	:	Shri Hiradhar Sahoo
SAHAJOG	:	Shri Kapoor Chand and Shri Bansidhar Sahoo
YAVARD	:	Shri Ajay Ku. Mohanta.

I hope this small piece of work will help the villagers of Gadabanikilo, Karadapal, Suruguda, Baghamunda and Talbahali for their better living opportunity in future.

With thanks,

Pravat C. Sutar.

Section - 1:

Objectives, Methodology, Village and Forest Profiles

Background

Forest resources play an immense role in the development of human society. Forests are closely inter-related with daily livelihood as well as with religion and culture. Pressure on forests is increasing daily because of the demand for forest products by a growing population and for various commercial activities. As people are using nature's gift of forest resources haphazardly and carelessly resulting serious adverse effect on the earth. As a major source of fuelwood, fodder and Non Timber Forest Products, forests supply subsistence and income goods to vast numbers of India's rural poor. According to one estimate, about 30 million people - most of whom are classified as "tribals"–derive some part of their livelihood from forests. In addition, forests play an important role in maintaining village economies by conserving environmental quality and the productivity of agricultural lands (Singh, N.; Sarin, M; Hiremath, S and Dhagamwar, V).

Throughout India's early history, people simply used the forests; they did not manage them. That use turned into abuse as colonial policies of appropriation were compounded by post-independence policies that placed a high priority on industrialisation. Today, only about 11 percent of the India's land area are classified as forests, and there is severe pressure on those dwindling forests from rapidly increasing populations.

Given the continuing dependence of tribals and other marginalised communities on forests, it is not surprising that it has been in the less developed forest regions of central and eastern India that community-based forest management has been instituted on a relatively large scale. This has taken two general forms. In one, State Forest Departments have actively encouraged local villagers to protect forest resources by promising them tangible benefits in return, typically a portion of the proceeds from the regenerated land. In 1989, the national government officially recognised the inappropriateness of traditional state management regimes and began promotion Joint Forest Management (JFM). In the second form, villagers seized the initiative themselves, without the encouragement of the State Forest Department or the presence of any economic incentive. Generally speaking, these "spontaneous initiatives" occurred because the government was simply not living up to its obligation of protecting the forests for those depended upon them for their very survival. Orissa is such bright example where people probably pioneered the process of spontaneous - self initiated forest management. Today, self-initiated forest protection is taking place on a significant scale in the eastern states of Orissa and Bihar, and to a lesser extent in Gujarat, Rajasthan, Karnataka, Madhya Pradesh and Andhra Pradesh. Faced with what these on the ground facts, state Forest Departments have little alternative but to formalise these community-based organisations.

The incentive to manage forest resources for greater livelihood security and improvement in their quality of life has liked to an observable upsurge in the efforts of local communities to protect their remaining forests. In these arrangements, villagers pool their resources in a communal fund, which is used to pay render protection services. The system is also characterised by the formulation and enforcement of elaborate forest protection rules that are binding upon the members of the community.

These efforts seem to have a "ripple effect"- once one village starts protecting its forests, nearby villages soon follow suit. To date, in Orissa approximately 6,500 community groups have regenerated their degraded forests.

COMMUNITY FOREST MANAGEMENT (CFM) IN ORISSA

Orissa is the one of the oldest states (as per peoples' perception) in designing community based forest management systems in the entire country. Communities claim to have taken up protection as early as 1950's. Guesstimates of the forest patches range to 1200.Area under protection and the number of communities involved range from 180000 acres (Approximately 3% of total forest area) and 1,181 organisations to 1.5 million hectares and 6,085 village committees (FD records) There is however, no consensus on this figures (Jonsson, S. and Rai, A., 1994).

Forest protection mechanisms differ district to district often each group of villages present its own management system. Villagers have organised themselves into informal and formal organisation The formal organisations are 'group of village elders', 'Village Forest Protection Committees

Although not fixed, steps that are site specific and variable over time and space, certain knowledge on sustainable NTFP resource management has been documented. Roughly estimate indicates if 50% of the total annual production of a particular NTFP species is left in the forest ecosystem as such, the sustainability of that particular NTFP species prevails. Of course keeping varied patterns of establishment, growth and production is noticed in different NTFP species, hence the concept probably differs. It has been noticed in few self initiated forest protection groups in Orissa and other parts in India, traditional knowledge of NTFP resource management is sound in the long run. It is qualitatively defined but rarely quantitatively. Thus, to correlate the traditional knowledge base with technical i.e. quantitative vs quantitative, if defines the present rate of resource extraction and to compared the desired level of extraction. Hence NTFP yield monitoring fells its importance in community based forest management systems. Besides it also assists in taking decisions on sharing production, marketing of the products and processing of it for better prices.

OBJECTIVES OF THE REPORT

The present study is the proceeding to a nation-wide research activity on different forest management practices and forest health during 1996 (base line studies, phase-I) co-ordinated by a national level Ecological and Economic Research Network (phase - II).

The major objectives of this report are:

Ecological/Vegetation issues:

- Impact of protection and management practices on vegetation regeneration, biodiversity and size class distribution of tree species and growing stock in protected forests.
- Growth rate of woody biomass.
- To study the impact of extraction on vegetation status and sustainable extraction limits. annual changes in productivity.
- Participatory monitoring of vegetation of community/jointly managed forest/ Social Forestry plantatations with participation of villagers and NTFP yield and production monitoring of such systems.

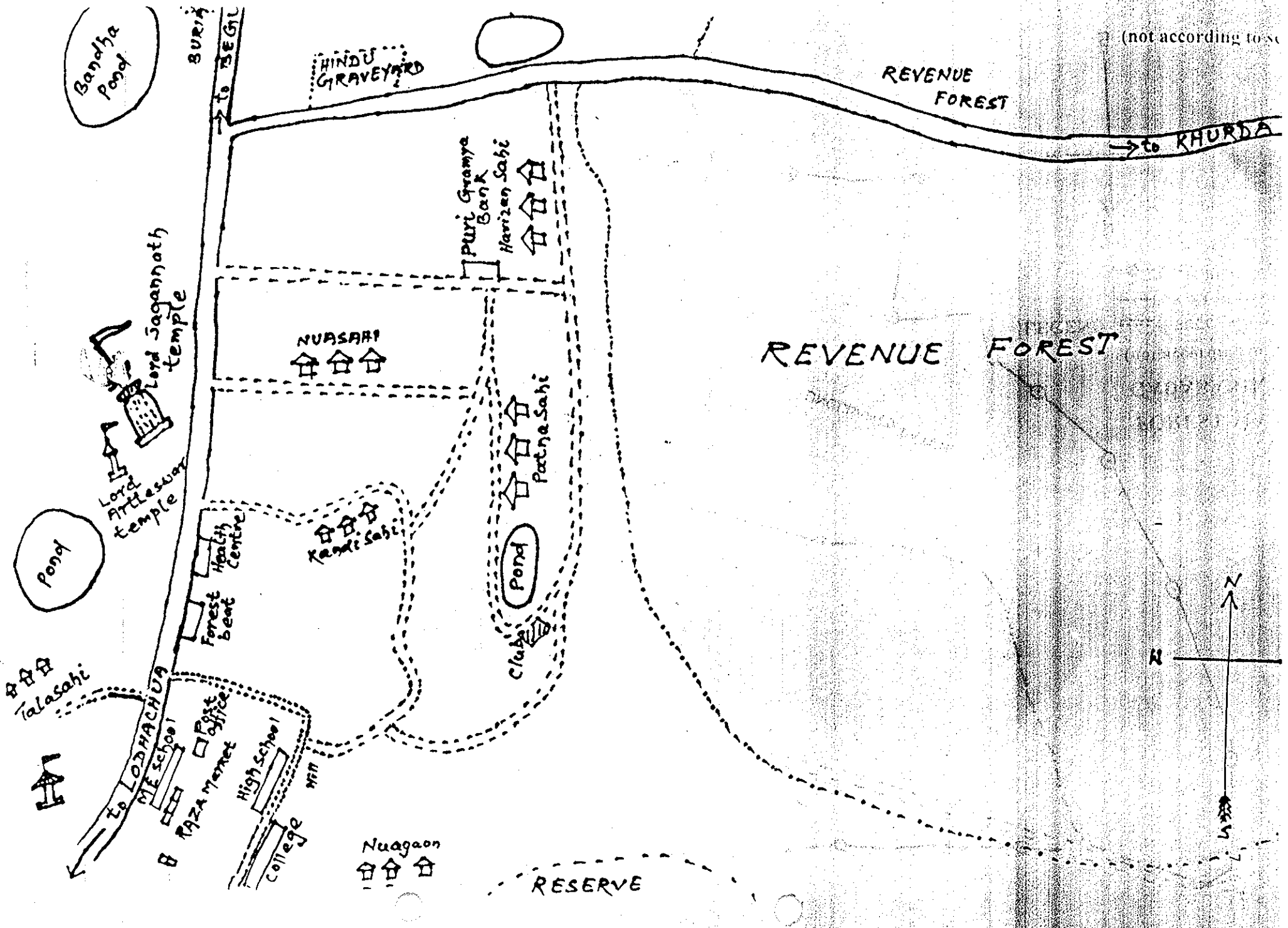
Institutional issues:

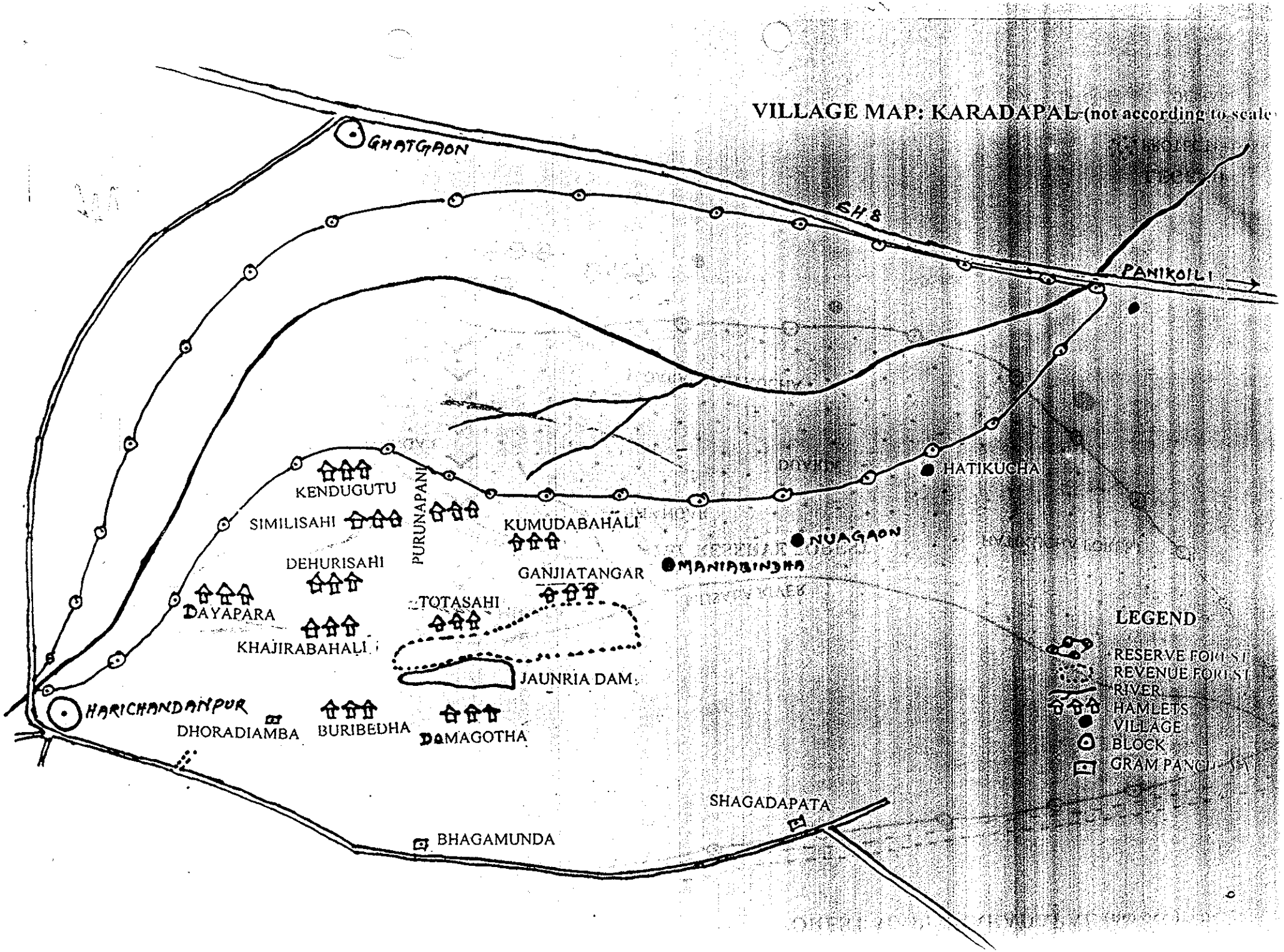
- To study diversity of community based forest management (CFM) , Jointly managed (JFM) systems and Social Forestry planatations in selected sites of Orissa.
- Structure and function of forest management systems in selected sites.
- Forest protection practices and regulations on extraction of firewood and NTFPs.
- Effectiveness of regulations and management systems.

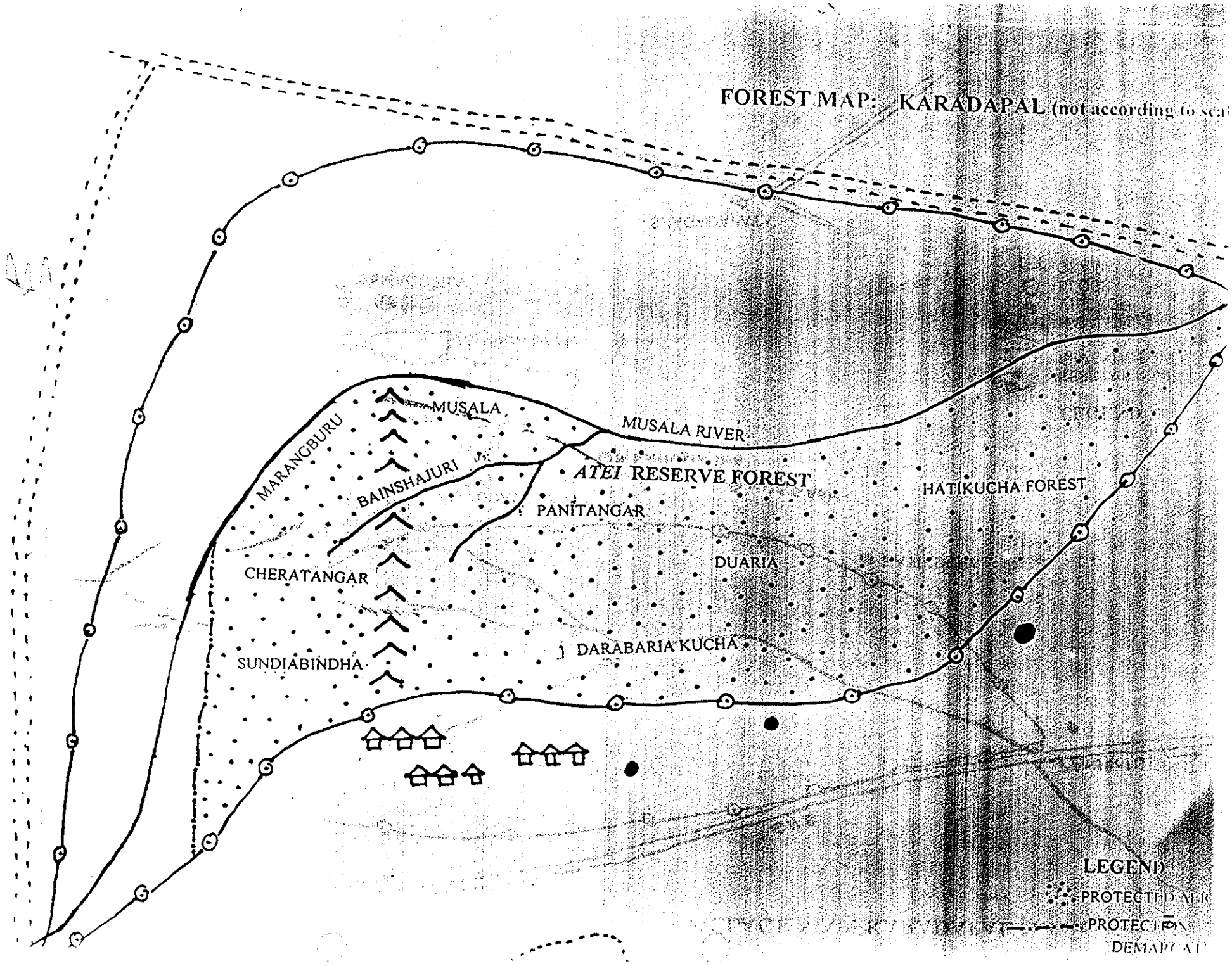
The study aims to generate the relevant facts on CFM, JFM and SF plantations in Orissan villages. The study was launched with the objective providing information to other researchers, policy makers, and to find out a scientific rationale for CFM and JFM. But when the research actually commenced the needs of the local people start gaining importance. The major objective thus became " how to help the community managing their forest to improve their Forest Management Methods and System". Thus, there was a need for the involvement of the forest protecting community during the monitoring process.

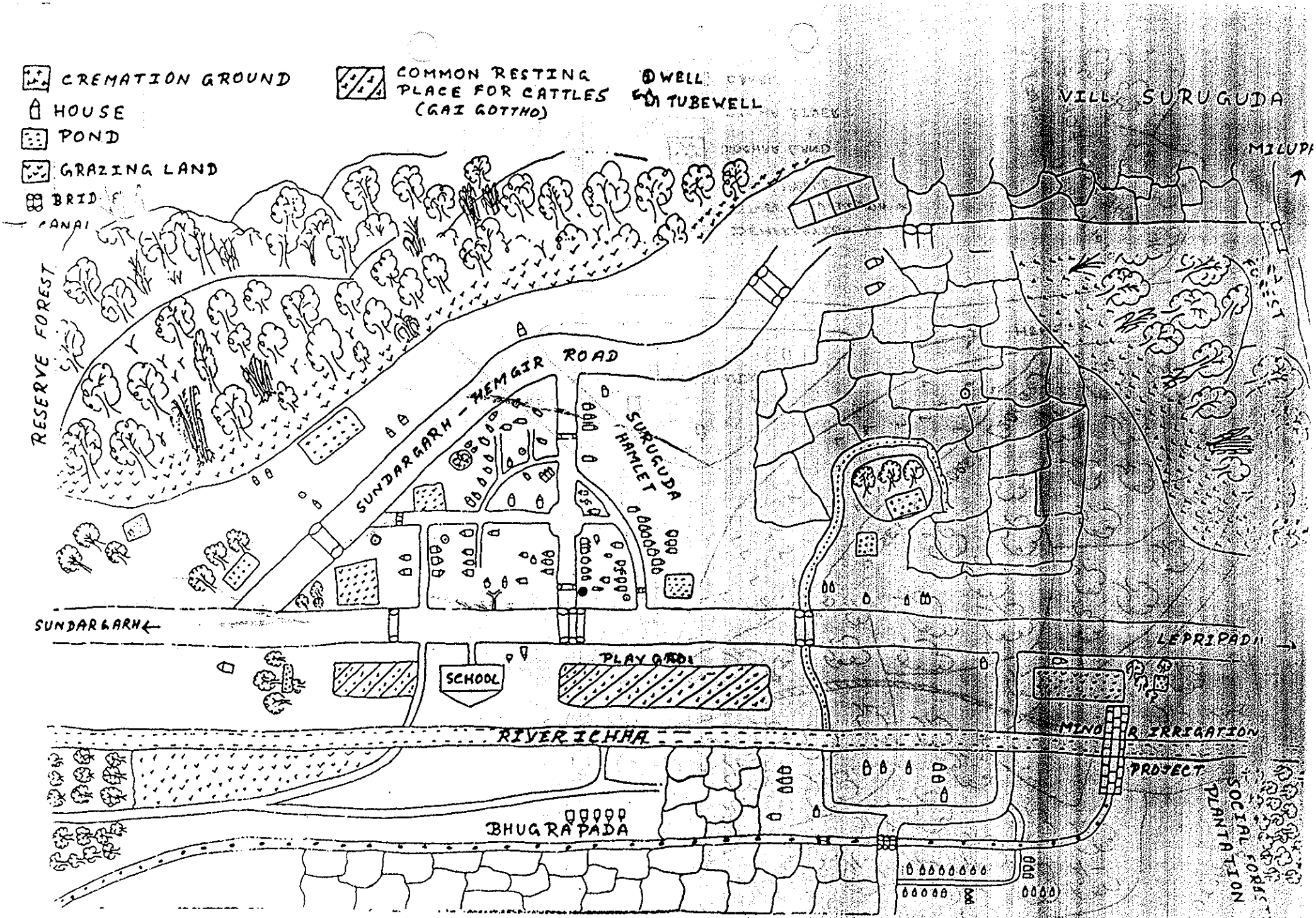
SELECTION OF SITES:

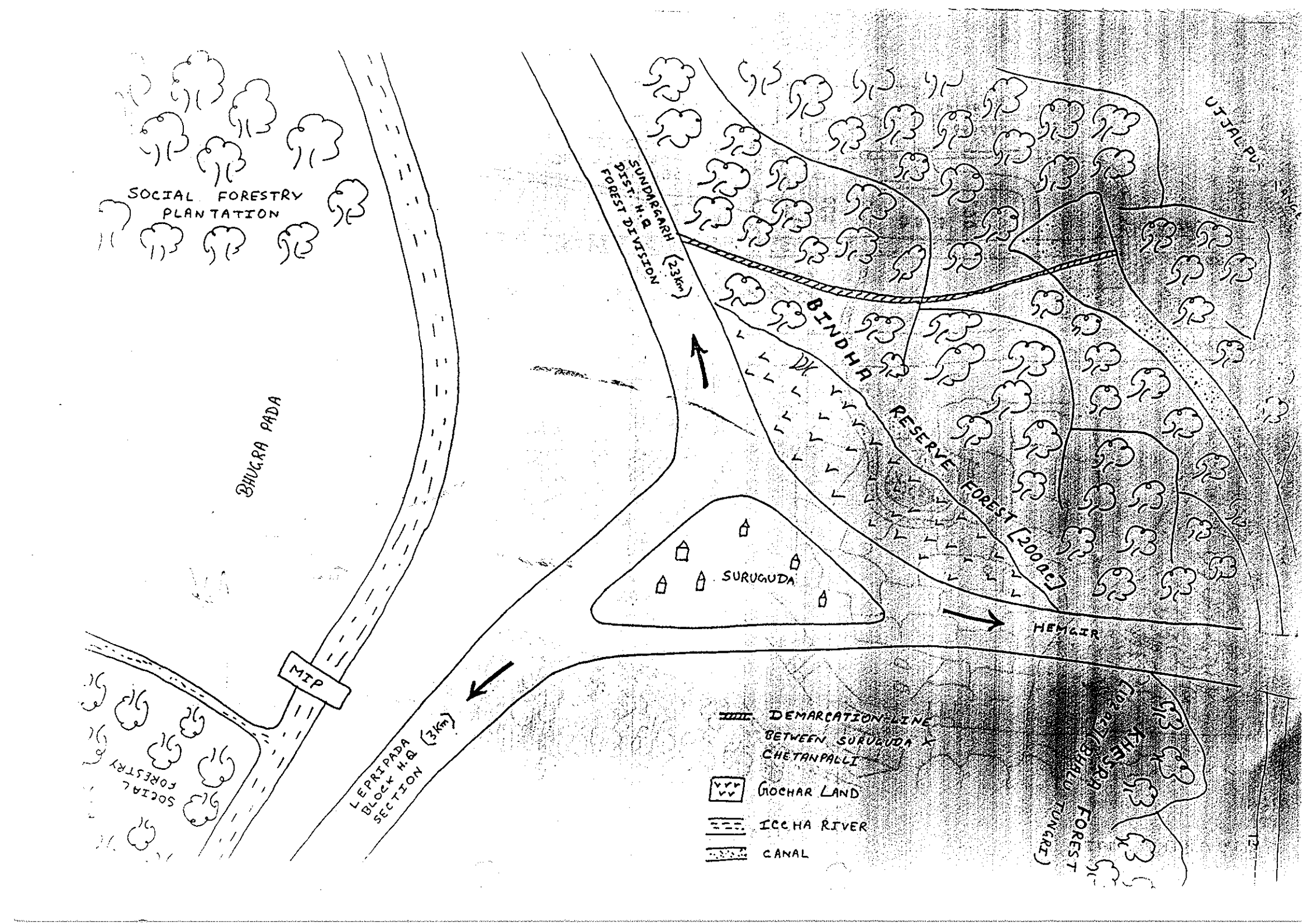
Sites in phase II of EERN included the older site Gadabanikilo village (CFM site,Nayagarh district) and four new sites Karadapal village (CFM site,Keonjhar district), Suruguda (CFM site converted to JFM, Sundargarh distt), Baghamunda (CFM site,Deogarh distt) and Talbahali (JFM site, Sundargarh distt) of Orissa .Older site was selected keeping in view of the changes occurred after the baseline survey carried out in the year 1996. Changes in all aspects mentioned above were focussed and in addition to the above, the other criteria as per the network. Same aspects were studied in the newly selected villages.

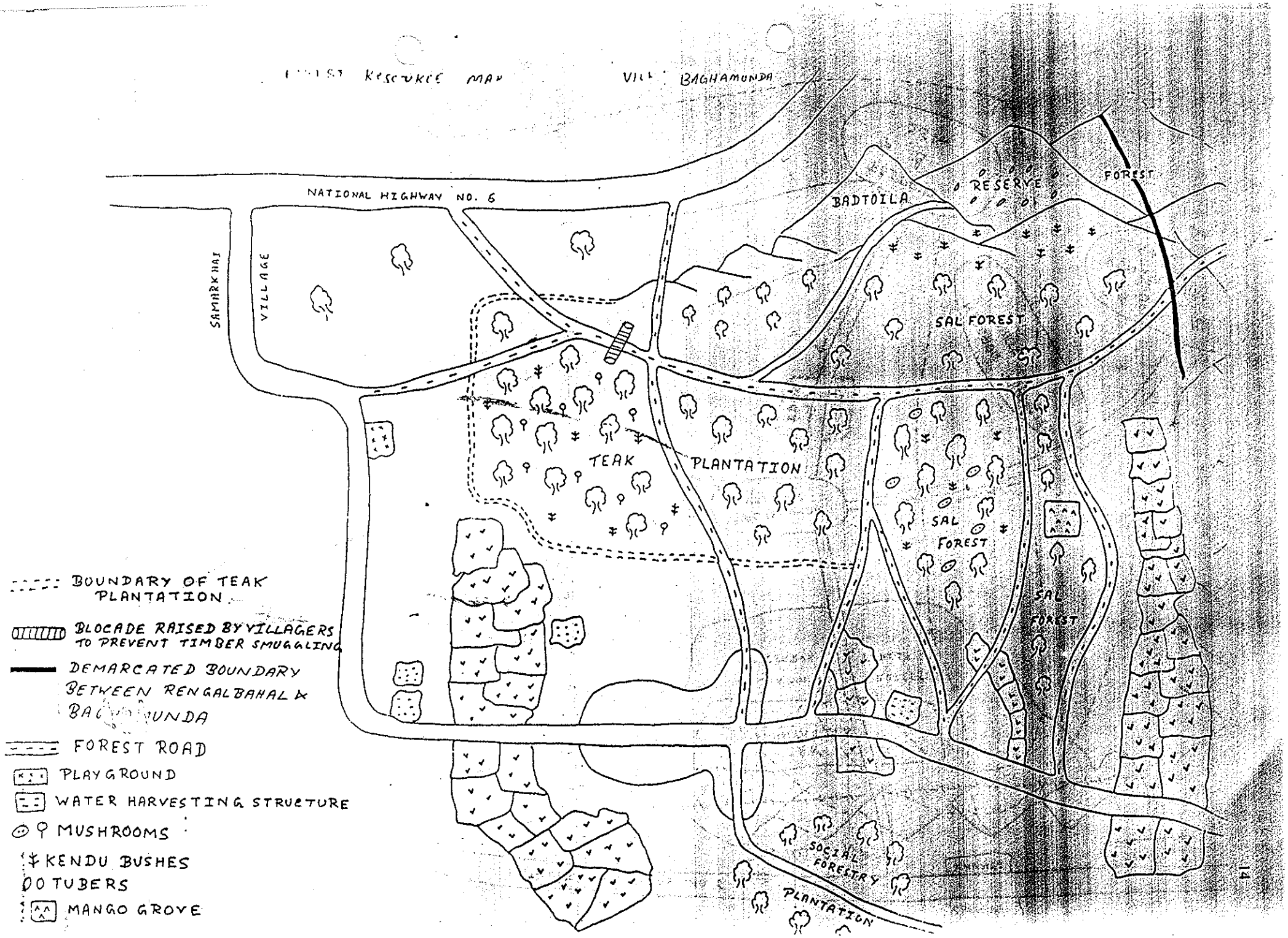

Bandha Pond
BURLA
to BEGU
HINDU GRAVEYARD
REVENUE FOREST
to KHURDA
Puri Gramya Bank
Harizan Sahi
Lord Jagannath temple
NUASAHI
REVENUE FOREST
Lord Attleswar temple
Pathe Sahi
Pond
Health Centre
Forest beat
Kandi Sahi
Pond
Club
Talasahi
to LODHACHUA
ME school
Post office
RAZA Memorial
High school
College
Nuagaon
RESERVE
N
W
S


VILLAGE MAP: KARADAPAL (not according to scale
GHATGAON
SH 8
PANIKOILI
HATIKUCHA
KENDUGUTU
SIMILISAHI
PURUNAPANI
KUMUDABAHALI
NUAGAON
MANIABINDHA
DEHURISAHI
GANJIATANGAR
DAYAPARA
TOTASAHI
KHAJIRABAHALI
JAUNRIA DAM
HARICHANDANPUR
DHORADIAMBA
BURIBEDHA
DAMAGOTHA
SHAGADAPATA
BHAGAMUNDA
LEGEND
RESERVE FOREST
REVENUE FOREST
RIVER
HAMLETS
VILLAGE
BLOCK
GRAM PANCHAYAT

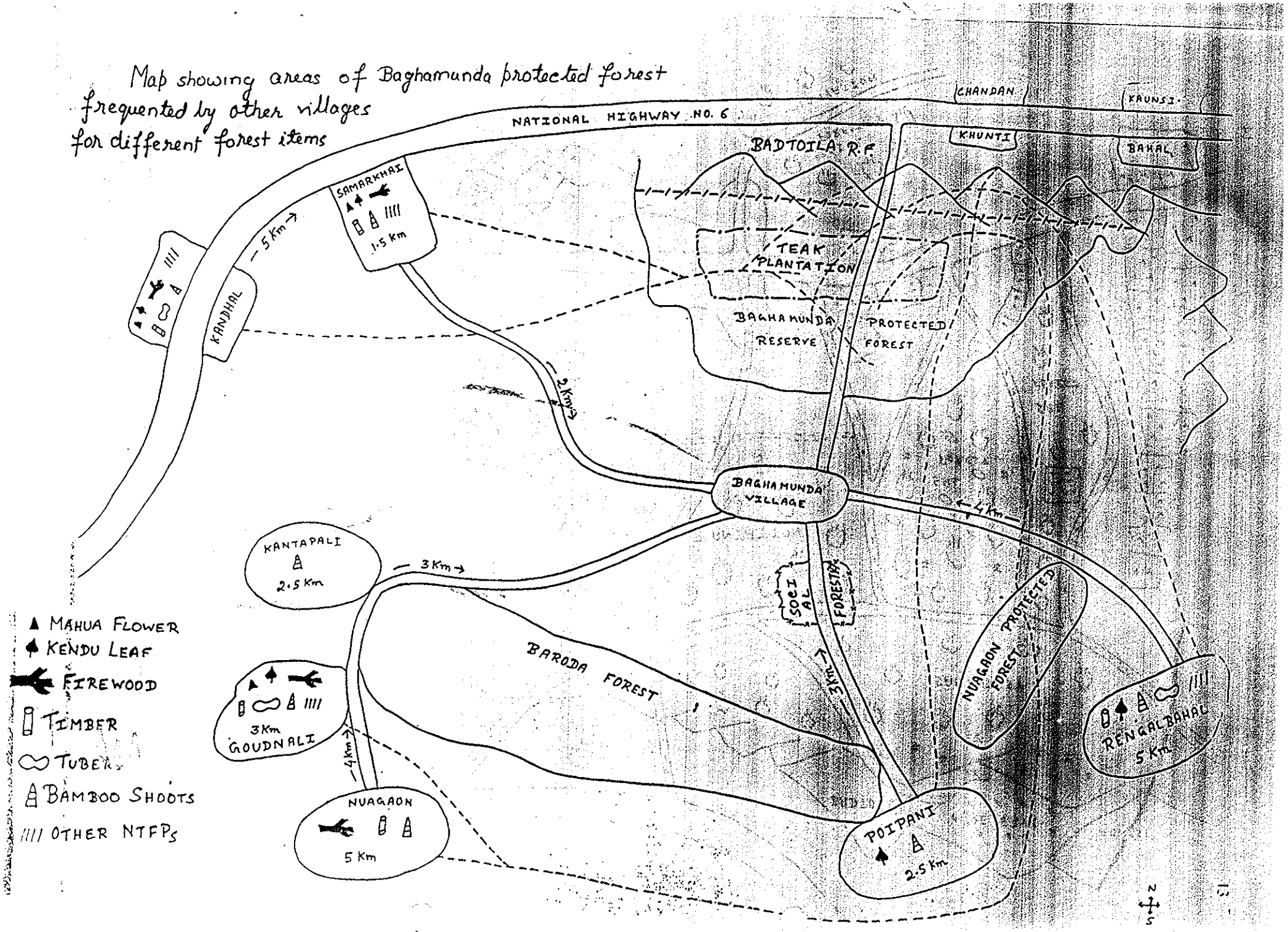

FOREST MAP: KARADAPAL (not according to scal
MUSALA
MUSALA RIVER
MARANGBURU
BAINSHAJURI
ATEI RESERVE FOREST
HATIKUCHA FOREST
PANITANGAR
CHERATANGAR
DUARIA
DARABARIA KUCHA
SUNDIABINDHA
LEGEND
PROTECTED
PROTECTED
DEMARCAT

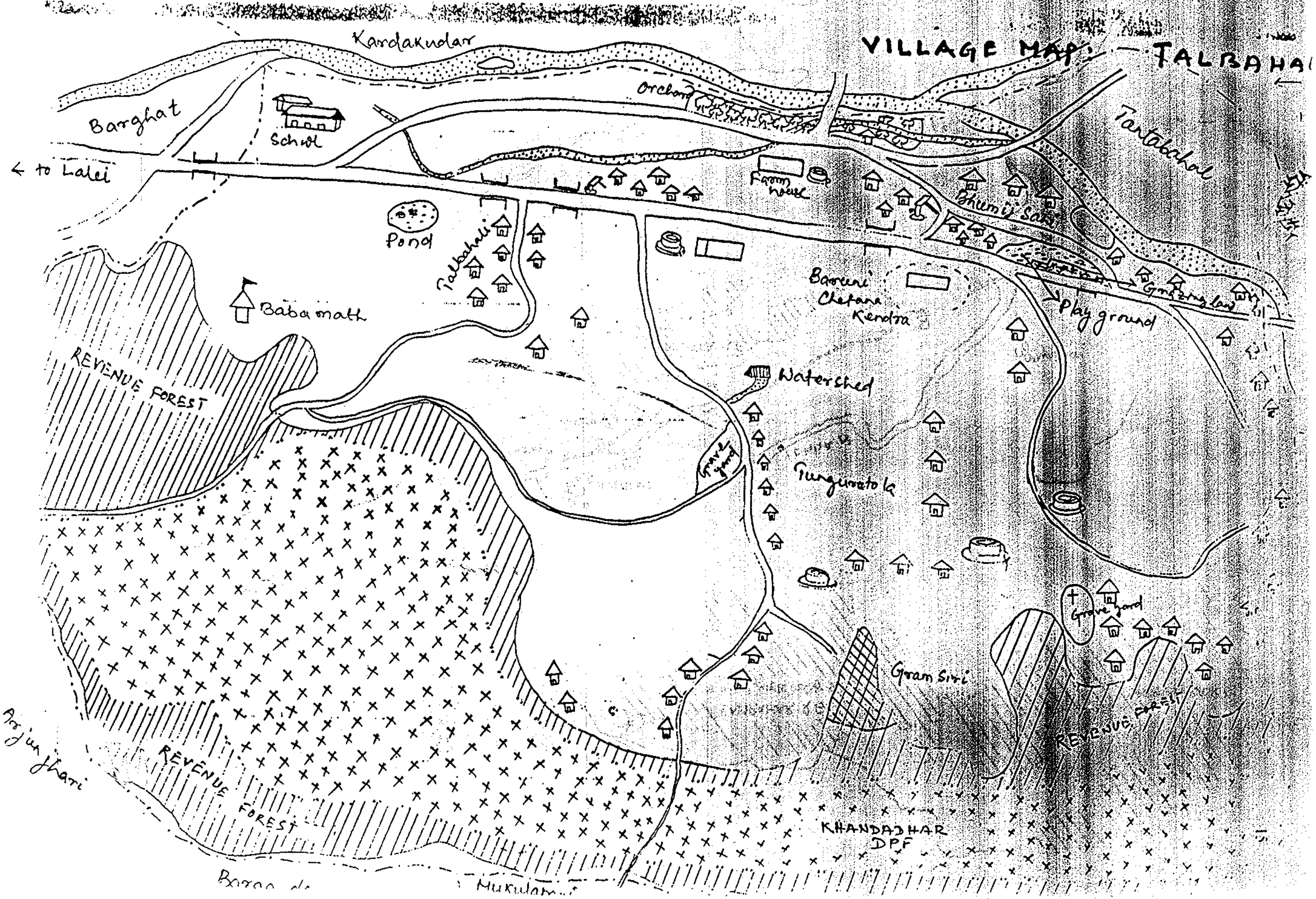

CREMATION GROUND
HOUSE
POND
GRAZING LAND
BRID
CANAL
COMMON RESTING PLACE FOR CATTLES (GAI GOTTHO)
WELL
TUBEWELL
VILL: SURUGUDA
MILUPI
RESERVE FOREST
SUNDARGARH - HEMGIR ROAD
SURUGUDA HAMLET
SUNDARGARH
SCHOOL
PLAY GRO
LEPRIPADA
RIVER ICHHA
MINOR IRRIGATION PROJECT
BHUGRAPADA
SOCIAL FORESTRY PLANTATION


SOCIAL FORESTRY PLANTATION
BHUGRA PADA
SUNDARGARH (23Km) DIST. H.Q FOREST DIVISION
BINDHA RESERVE FOREST (200 Ac)
SURUGUDA
HEMGIR
MIP
LEPRIPADA BLOCK H.Q (3Km) SECTION
SOCIAL FORESTRY
DEMARCATION LINE BETWEEN SURUGUDA & CHETANPALLI
GOCHAR LAND
ICCHA RIVER
CANAL

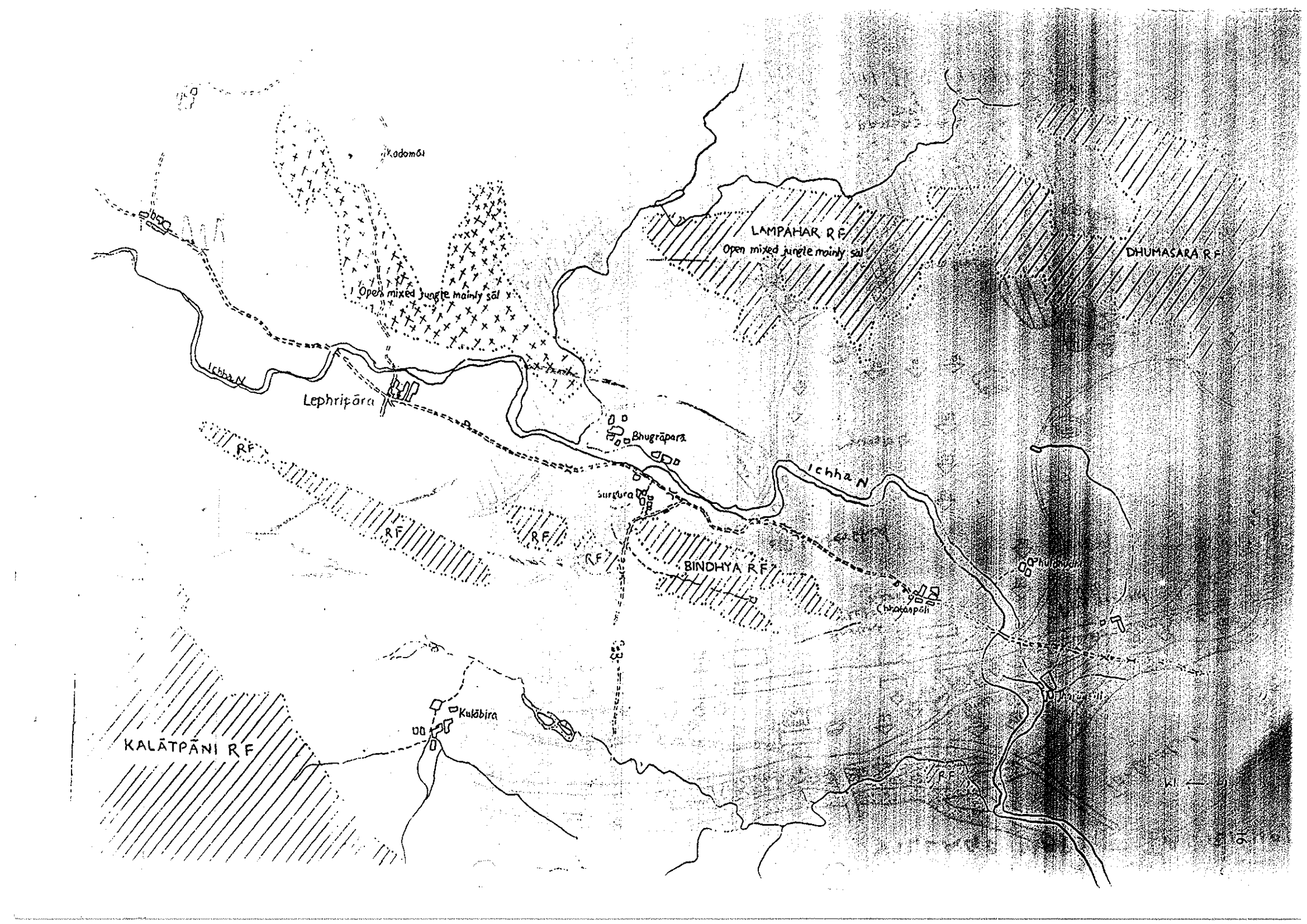

RESOURCE MAP
VILL BAGHAMUNDA
NATIONAL HIGHWAY NO. 6
SAMARKHAI
VILLAGE
BADTOILA
RESERVE
FOREST
SAL FOREST
TEAK
PLANTATION
SAL
FOREST
SAL
FOREST
SOCIAL
FORESTRY
PLANTATION
BOUNDARY OF TEAK PLANTATION
BLOCADE RAISED BY VILLAGERS TO PREVENT TIMBER SMUGGLING
DEMARCATED BOUNDARY BETWEEN RENGALBAHAL &
FOREST ROAD
PLAY GROUND
WATER HARVESTING STRUCTURE
MUSHROOMS
KENDU BUSHES
TUBERS
MANGO GROVE

Map showing areas of Baghamunda protected forest frequented by other villages for different forest items





VILLAGE MAP - TALBAHAL
Kandakudar
Barghat
← to Lalei
School
Orchard
Farm house
Bhumij Sahi
Tantabahal
Pond
Talbahali
Baba math
Bawani Chetana Kendra
Play ground
Grazing land
Watershed
Grave yard
Gungurutola
Grave yard
Gram Siri
REVENUE FOREST
REVENUE FOREST
REVENUE FOREST
KHANDADHAR DPF
Arjun Jhari


Kadomāi
LAMPAHAR RF
Open mixed jungle mainly sāl
DHUMASARA RF
Open mixed jungle mainly sāl
Ichha N
Lephripāra
Bhugrāpara
Ichha N
RF
RF
RF
RF
BINDHYA RF
Chhotanpāli
KALĀTPĀNI RF
Kulābira
RF

VILLAGE AND FOREST PROFILES

Village profile: ***GADABANIKILO***

Village: Gadabanikilo
Gram Panchayat: Khairapalli
Block: Ranpur
District: Nayagarh
State: Orissa
Geographical location: 85° 23'N and 85° 24' N latitudes and 20° 3' E and 20° 4' E longitudes.

Surrounding villages:

Villages	Direction of location
Giridharpur	North west
Sanapathuria	North
Gunduria	north-east
Durgapur	East
Khunta bandha	south-east
Sanakilo	South

Total HHs : 145
Population : Approx. 1500 (1991 census)
Sex ratio(women:men): 1005:1000

Two households have been increased since 1996, total number of HHs have been increased to 145 from 143 (1996).

It is only seven kilometres away from the state highway linking Chandpur and Rajsunakhala, in the northeast corner of Ranpur. The village inherits its name from the Ranpur Kingdom. It was one of the four 'Gadas' (forts) of the Ranpur king. This village was strongly associated with the anti British campaigns of the Orissan Gadajats and is famous for memory of martyrs Raghunath Mohanty and Dibakar Parida, popularly known as Raghu – Dibakar, two famous revolutionaries of the state.

DEMOGRAPHY:

Caste/Religion composition

The main caste / religious groups are Brahmin, Mali, Bhandari, Khandayat, Sundhi, Sudra, Harijan and Muslims (please refer table 1.1). This village is largely dominated by Khandayats: - the warrior peasants of the erstwhile kings. The village consists of seven sahis (small hamlets) which are situated close proximity to each other. Some of them are new as people have recently settled there due to increase in population and breaking down of joint families. The seven sahis (hamlets) are Gada Sahi, Sudra Sahi, Nua Sahi, Harijana Sahi, Patna Sahi, Mohammadian Sahi, College Sahi and Nuagaon. The last two are new hamlets. The village is also surrounded by a few tribal hamlets belonging to other villages. The tribals of these hamlets are highly dependent on this forest.

Table 1.1: Caste composition and respective HHs of Gadabanikilo village.

Social categories	Type of Soc. Category	No. of Households	% representation
Brahmins		13	8.96
Bhandari	Barber	1	0.005
Sundhi	Wine sellers	6	4.14
Gauda	Milk men	5	3.55
Harijan	S. C.	14	9.66
Sudra		13	8.96
Odiya Khandayat	Warrior Peasants	75	51.82
Gudia	Sweet Seller	3	2.12
Mali	Lord Shiva Worshipper	4	2.86
Muslims		11	7.7
Total		**145**	**100.00**

Socio-cultural aspects

Irrespective of different religions, people maintain harmony and there exists a strong cultural unity. Hindu and Muslim have peaceful co-existence and they not only share common issues and problems but also each other's festivals. For *e.g.* Raza is an Oriya Hindu festival but even the Muslims also take equal part in this celebrations. Muslims also play a significant role in the Dussehra celebrations.

Socio-economic conditions:

Agriculture is the primary occupation and almost three-quarters of the main workers are classified as cultivators or agricultural labourers (please refer table 1.2). Primary occupation based on livestock, forestry, fishing related occupations constitute only 2% of village labourers. Irrespective of any primary occupations, all have significant role in forest protection initiatives in this village.

Table 1.2: Caste composition with respect to their respective occupation and dependency on forests

Social categories	**Type of Soc. Category**	**Primary Occupation**	**Secondary occupation**	**Period of dependency on occupation**		**Forest Dependency**
				Primary	**Secondary**	
Brahmins		Agriculture	Worshipping God, Service holders	Entire year		Low dependency
Bhandari	Barber	Shaving and haircutting	Agriculture	Entire year		Low dependency
Sundhi	Wine sellers	Agriculture	Seasonal labour	8 months	4 months	Low dependency
Gauda	Milk men	Agriculture	Seasonal migration and agricultural labour.	4 months	8 months	Low dependency
Harijan	S. C.	Agriculture and basket weaving		Entire year		Low dependency
Sudra		Agriculture	Service holders	Entire year		Low dependency
Odiya Khandayat	Warrior Peasants	Agriculture		Entire year		Low dependency
Gudia	Sweet Seller	Agriculture		Entire year		Low dependency
Mali	Worshipp-er	Agriculture		Entire year		Low dependency
Muslims		Agriculture	Service holders	Entire year		Low dependency

Forest Profile: **GADABANIKILO**

Forest Division: Khurda
Forest Range: Ranapur
Status of forest: Revenue and Reserve Forest.
Type of forest: Tropial Moist Deciduous (miscellaneous type)

Gadabanikilo forest constitutes of both Revenue and Reserve Forest. Revenue forest dominating the later. Area of Revenue Forest is 324 acres* (130 ha) and that of Reserve Forest are 30 acres *(12 ha). Visual and detailed study of these patches shows quite difference between their

* Corrected area of forests

population structure of different species. Revenue forests are found to rich in species composition accommodating most of the Tropical Moist Deciduous Forests but on the other the Reserve Forest is left with dominating Mahula (*Madhuca latifolia*) which is selectively restored for collection of Mahula flowers.

Forest terrain is flat. One of the significant characteristics is noticed in Gadabanikilo forest is that it is a miscellaneous type of Tropial Moist Deciduous where either presence of Sal (*Shorea robusta*) or teak (*Tectona grandis*) is not noticed besides other species typical to moist deciduous forests. The species representing this forest are *Madhuca indica, Buchanania lanzan, Mangifera indica, Terminalia chebula, Terminalia bellerica, Emblica officinalis, Aegle marmelos, Semecarpus anacardium, Syzygium cuminii, Diospyrus sylvatica, Diospyrus melanoxylon, Azadirachta indica, Strychnos nuxvomica*, etc. All species found are in association with each other but the former two species dominating the rest other. Under storey species found to be dominating with *Alangium hexapetalum, alangium lamarckii, Flacourtia sepiaria, Tragia involucrata, Tridex procumbens, Vitax pedancularis, Leucas aspera, Abrus precatorius, Smilax macrophylla* etc.

Different patches of forest are named according to different level of species dominance, use practices of the patches and extent of disturbances.

Soil Characteristics:

Soil of Gadabanikilo is red loamy soil mainly Haplustalts, Paleustalts and Rhodustalts which are arid, moderately good for cultivation and suitable for forestry.

Rainfall

The average annual rainfall ranges from 1000 – 2000 mm with more than three-quarters of the rain coming from June to September.

Village profile: ***KARADAPAL:***

Village: Karadapal
Gram Panchayat: Dhorudiamba
Block: Harichandanpur
Police Station: Harichandanpur
Sub Division: Keonjhar
District: Keonjhar
State: Orissa
Surrounding villages:

Villages	Direction of location
Ghatgaon	North
Tikira	North East
Sagadapata	East
Hatikucha	East -South East
Nuagaon	South East
Maniabindha	South - South East
Bhagamunda	South
Taladihi	South - South West
Harichandanpur	South West

No of hamlets: 11
Social Categories: Tribes, Scheduled Castes and other Backward Castes.
Total HHs: 247
Population: 1000

This village can be accessed from the state highway joining Panikoili to Keonjhar at the Ghatgaon tourist spot (one of the important tourist spot famous for *Maa Tarini*, 80 kms west from Panikoili, place on NH 5). Village can be reached via Harichandanpur (15 kms SW from Ghatgaon) and Bhagamunda (12 kms SE from Harichandanpur). As per peoples' perception, this village is the first village to initiate the Community participation in managing the forest in entire Keonjhar district.

DEMOGRAPHY:

Caste/Religion composition

All villagers are Hindus. Caste composition indicates tribals dominate this village (Please refer table 1.3). Other castes include lower caste people such as Scheduled Castes and other backward castes. Tables 1.4 and 1.5 give a clear picture of the demography with respect to hamlets and dependence on the forest by the village.

Table 1.3: Caste composition and respective HHs, Karadapal village

Social categories	Type of Social Category	No. of Households	% representation
Tribals (ST)	Kolha	122	49.34
	Majhi	12	4.8
	Sabar	80	32.38
S.C.	Weavers	3	1.21
O.B.C.	Kamara	2	0.8
	Kunkel (Kumbhar)	10	4.04
	Gau (Milkmen)	18	7.28
Total		**247**	**100.00**

Table 1.4: Hamlets with respect to social categories, karadapal village.

Sl no.	Hamlets	Social Categories
1	Similisahi	Kolha, Sabar, Gau, Kamara
2	Dehurisahi	Sabar
3	Totasahi	Kolha, Kamar, Kunkel, Gau, Tanti (Weavers)
4	Kumudabahli	Kolha, Gau, Sabar
5	Purunapani	Kolha, Gau
6	Ganjiatangar	Kolha, Gau, Kamar
7	Domagotha	Majhi
8	Buribedha	Kolha, Kumbhar
9	Dayapara	Kolha, Sabar, Gau
10	Kendugutu	Gau, Kolha
11	Khajirabahali	Kumbhar, Sabar

Socio-economic conditions:

As per table 1.3 Karadapal is mostly dominated by the tribals representing almost 86 % of the total households and as per table 1.5, villagers of this village are dominantly dependent on agricultural practices and forest product collection. Of these above caste composition, tribals are the dominant forest produces collectors basically the NTFPs and livelihoods are dependent on these practices through rest of the year.

Almost all households who own land go for agricultural practices. Land holding by these villagers are both *Patta* (registered) and encroached lands. Irrespective of landholding types people go for cultivation Landless farmers go for either share cropping or wage labour besides their traditional primary occupations.

Dependency on the forest varies from different tribal groups.

Dependency on forests:

Kolha:

These tribes both men and women collect variety of NTFPs from the forest. NTFPs include Mahula flowers, Tola (Mahula seeds), Char seeds, Harida fruits (chebulic myrobalans), Bahada fruits (belleric myrobalans) and gums, Bhalia fruits and nuts, Sal fruits, Sal seeds, Sal leaves, tender Sal sticks, Jhuna (Sal latex), mushrooms, Pal (*Phoenix spp.*) leaves, Tassar cocoons, Lac, Van Tulsi etc. These are collected and processed to different degrees for either personal use or selling or both purpose. For food, these tribes collect diverse tubers (*Dioscorea spp*).

Majhi:

These tribes do need certain forest products for their own use. Their livelihood is not based on the extraction of forest products due to the fact that their residing hamlet is quite far from the forest that provides these products. By tradition, they collect Mahula (Mahua flowers) and prepare country liquor in the local haats (local markets).

Table 1.5: Caste composition with respect to their respective occupation and dependency on forests, Karadapal

Social categories	Type of Social Category	Primary Occupation	Secondary occupation	Period of dependency on Primary occupation	Forest Dependency
Tribals (ST)	Kolha	Agriculture	NTFPcollection, seasonal labour	6 months	Major dependency
	Majhi	Agriculture	Country liqour preparation (from Mahula)and selling	6 months	Low dependency
	Sabar	Agriculture (few HHs)	Fruits collection, leaf plate stitching, selling of firewood.	3 months	Major dependency
Scheduled Castes.	Tanti (Weavers)	Cloth weaving	Seasonal migration	6 months	Low dependency
Other Backward Castes.	Kamara	Manufacture of iron implements	Very few on agriculture	12 months	Low dependency
	(Kunkel) Kumbhar	Pottery	Share cropping	8 months	Moderate dependency
	Gau (Milkmen)	Wage labour		Almost the year	Low dependency

Sabar:

The forest products collection by the Sabar resembles with the kolhas. But since their hamlet is vicinity to the Reserve Forest, illegal tree felling to a lesser extent (even sometimes saplings) are noticed.

Tanti (Weavers):

They don't collect forest products as they income their livelihood from their traditional occupation.

Kamara (Blacksmith):

They are busy throughout the year in making agricultural implements, arrows, and other hunting implements and sell them in the local markets for their livelihood They also repair the iron implements

Kunkel (Potters)

They depend on the forest only for firewood for burning of earthen materials.

Gau (Milkmen):

They do not depend on the forest rather prefer for wage labour in others' lands during agricultural seasons and migrate to towns during other seasons.

Forest profile: ***KARADAPAL***

Forest Division	:	Keonjhar
Forest Range	:	Deogaon
Status of forest	:	Revenue and Reserve Forest.
Type of forest	:	Northern Tropical Dry Deciduous

The status of the forest protected by the villagers of Karadapal are both Reserve and Revenue Forest. These villagers take part of two forest protection committees. These committees are namely, Karadapal Vana Surakhya Committee (Karadapal Forest Protection Committee, KFPC in brief) which is absolutely a village forest protection committee and Anchalika Vana Surakhya Committee (Regional Forest Protection Committee, RFPC in brief): - a regional federation of few surrounding villages protecting a common forest patch. The forest protected by the Karadapal villagers is the Revenue Forest (near Jaunria dam, please refer map 6) and that of protected in association with other villagers is the Reserve Forest (locally called as *Atei* jungle). Most of the forest products are extracted from the Reserve Forest. However, Revenue Forest also contributes some forest products (the reason why this forest is less efficient in providing these products is attributed to its immaturity, details are dealt in Institutional Section and Vegetation Analysis Section of the report) to the villagers.

Area of the existing Revenue forest is 150 acres[=] (60 ha). The area of Reserve Forest is approximately 12,000 ha[==] (thus, area under protection of this village is approximately 2,000 ha[===])

The Reserve Forest of Karadapal is divided into different patches similar to Gadabanikilo. The forest patches are Sundia Bindha, Darabaria Kucha, Panitangar, Duaria, Cheratangar, Marangburu and Musala*. The Revenue patch is named as Ganjia Tangar. However, there exists no such use or management practices in these patches and the reasons behind the nomenclature is still unknown.

Karadapal forest represents Northern Tropical Dry Deciduous type of forest. The species representing this forest are *Shorea robusta, Madhuca indica, Buchanania lanzan, Mangifera indica, Terminalia chebula, Terminalia bellerica, Terminalia arjuna, Terminalia tomentosa, Anogeissus latifolia, Aegle marmelos, Semecarpus anacardium, Boswellia serrata, Sterculia urens, Diospyrus melanoxylon, Dalbergia sisoo, Pterocarpus marsupium* etc. All species found are in association with each other. Under storey species found to be very few or absent due advent of summer season and forest fire.

Soil Characteristics:

Soil of Karadapal is red and yellow soil mainly Haplustalts, Ochraquults and Rhodustalts which are arid, moderately good for cultivation and land with some limitations for forestry and grazing.

Rainfall

The average annual rainfall ranges from 1000 – 2000 mm per annum.

[=]the word "existing" is being used due to fact that villagers have encroached revenue forest land for their own private lands.

[==]the word approximately used because the villagers were unable to tell the exact area of the forest and this is an estimated figure.

[===] it is assumed that all villages share equal responsibilities in forest protection of *Atei* Reserve Forest.

* all are local names

Section - 2:

Institutional mechanism towards forest management systems

During the pre independence period the village was directly under king's administration. At the village level, the Gauntia with help of 'Panch Bhlaloks' (Council of elders) was responsible to mange the internal comprised of elders from Agharia, Bhuiyan and Teli caste.

Demography

Suruguda is a heterogeneous village with the presence of the following castes: Agharia, Brahmin, Bhuiyans, Harijan, Ghamar, Gond, Teli, Dhanwar, Gauda, Kissan, Keuta, Lohar, and Majhi. Agharia is the dominant caste-group in the village.

Detailed caste composition of hh involved in forest protection is given in Table 1.6

Table 1.6 : Households involved in forest protection:

Hamlets (Pada)	Total hhs	Caste Groups	hh distn.
Agharia Pada	19	Agharia	19
Bhuinya Pada	38	Bhuinya	16
		Agharia	10
		Dhoba	3
		Teli	5
		Barika	2
		Keuta	2
Gauda Pada	24	Gauda	15
		Dhanuar	6
		Lohar	3
Harijan Pada	22	***Chamar***	3
		Harijan	13
		Agharia	1
		Ghasi	5
Brahman Pada	25	Bhuinyan	3
		Teli	1
		Brahman	3
		Agharia	5
		Kisan	10
		Gond	3
Bandha Pada	7	Agharia	5
		Bhuinyan	2
Milu Pada	20	Kisan	20
TOTAL HHS	155		

Occupation

Agriculture, Service, Agricultural labour, construction labour, Blacksmith, Milkman, Carpentry and Bamboo weaving are the few major occupation in the village. The carpenters get wood from the unprotected forest areas, which is about 15 to 20 Km away from the village. The Bamboo weaving is an occasional occupation, only when they get any order they get engaged in the activity. A few households are involved in leaf plate and cup making as a supplementary economic activity.

Forest Resource of the village

Forest profile	:	***Suruguda***
Forest Division	:	Sundargarh
Forest Range	:	Ujjalpur
Status of forest	:	Reserve Forest.
Type of forest	:	Northern Tropical Dry Deciduous

Forests adjoining to the village are Bindha Reserve forest (R.F.) and Bhalutungri Khesra forest.

At present, Suruguda village is protecting 80 hectares of the Reserve Forest and 40 hectares of Khesra forest (revenue forest). Bindha R.F. was declared as Reserved Forest in the year, (vide notification no: 1166FD/12F-M/2-152/62-CF, OFA, 1972).

The forests is mixed Sal forests, the main forest species are Sal and its associates such as Asan, Dhaula, Bheru, Sidha, Karda, Char, Kendu, Dhuben, Salhaya, Kekat, Banem, Khair, Gamhar etc. The R.F. is on the hills and the lower part of the R.F. has a gentle slope and a dominant crop of Sal coppice. The vegetation in the upper reaches is dominated by bamboo.

Village Management, Institution & Decision Making

With the cessation of Gauntia system the control of Gauntia got weakened in the post-independent period. And instead many community institutions emerged. However, this does not mean that the role of Agharia community has diminished rather in new situation in all most all community institution they play an important role.

In Suruguda village, number of committees have been formed to manage different matters like the school committee Puja(festival) Committee etc. However decisions relating to village matters are taken in the village committee meeting in a collective manner.This forum is also used to solve disputes within the village. Normally disputes relating to inter-personal conflict, functioning of other committee are referred to the village meeting. The affected person intimate the ward member about the dispute, who in turn calls the village meeting by circulating notice through Katuala. Only male are allowed in this meeting and the women are not allowed. The decision taken in such meeting is normally adhered to. In case the matter is not resolved within the village or there is violation it is refered to civil administration.

FOREST MANAGEMENT

FORESTS AROUND SURUGUDA: THE CHANGING SCENARIO

The forest was in full vigour around 1950-55 when subsequent coupe felling by the government accelerated the process of forest degradation. The last leasing operation (leasing of coupes to contractors for timber felling) was carried out around 1970-75. During it's better days, the forest had a good concentration of trees like Sal, Bija, Karla, Bamboo, Khair, Gamhar, Kendu, Domkurlu, Kurlu, Vherua, Dhaula, Dhuben, Salheya, kekat, Banem, Sishu, etc.

The forest got degenerated further between 1975-85. As one sees the following are the major behind degeneration of forest in the year 1975-85.

a) forest was leased out by the government to the contractors.
b) Extravagant use of wood by villagers, especially by the Agharia community. It could be
c) observed that every Agharia house has consumed a lot of wood. At places one shall find that a whole tree has been used.
d) Excessive grazing (As far as grazing is concerned HH from all communities having domestic animals were involved)
e) Uncontrolled forest fires and
f) Stone quarrying operations.

Since 1985, after the initiation of forest protection the forest have started regenerating. At present the forest stand is quite dense but the concentration of trees like Sishu and Khair has reduced. The regeneration has brought about some congestion, the trees are of average side. Bamboo, which are totally depleted has now came back and is yielding harvest.

VILLAGE PROFILE

Village profile: ***Baghamunda***

Village: **Baghamunda**
Gram Panchayat: Kandhal
Block: Barkote

Police Station: Deogarh
Sub Division: Deogarh
District: Deogarh
State: Orissa

No of hamlets: 1
Social Categories : Homogenous (Gond tribes)
Total HHs: 26
Population: 130(approaximately)

Overview:

Baghamunda is a small homogenous village consisting of 26 households of *Gond* tribe. There is very little class distinction between the villagers as people have very less agricultural *patta* (recorded) land and mostly depend on wage labour. Dependence on forests is also high with a few landless households engaging in "illicit" supply of timber (from the non-protected forest patches), as well as for fuel-wood, and NTFPs both for self-consumption as well as sale.

The village has high degree of unity with all the households being of the same tribe. The economic disparity in the village is not pronounced. The unity of the village is very evident in all the activities taken by the community so far and has been a critical factor for the success of the forest protection activities. A local NGO, Sahajog, having their office in the village have also played a major role in enhancing the capacity of the villagers and making them aware of the issues related to forest and other resources.

Though a number of other communities are protecting forests in the area, the Baghamunda forest protection initiative is a unique one because of the key role of women in forest protection and management. The village, despite having only 26 household protects a large area, which is approximately 500 acres (as claimed by the villagers) of Badatailа Reserve forest.

The first effort at community protection started with the village protecting the SFP plantation after a Village Forest Committee was formed by the FD for managing the plantation. A youth club was formed in the village in 1991 by Sahajog, a local NGO, and subsequently decided to protect the forest. The key motivation for initiating forest protection seemed to be shortage of fuelwood and other forest products and motivation by Sahajog. However, the protection was very loose till 1993 when it was formalised by the Youth club and patrolling was started to check tree felling by outsiders. This led to a number of conflicts with nearby villagers where the YC members were even physically assaulted.

The Youth club were unable to protect the forest because of these conflicts with neighbouring villages. Another contributing factor was lack of support of the FD in resolving the conflicts. After six months of the breakdown of the protection, the protection effort was reinitiated by the village through the Mahila Samiti. It seems that the community decided to give the responsibility to the women through the existing Mahila Samiti as an strategy to handle physical conflicts with people coming from outside. The protection was restarted by the women, broke down after a short period and was again taken up. Thereafter the protection effort has sustained till date inspite of a number of major and minor conflicts. The Mahila Samiti in co-operation with the village leaders oversees the protection and management of the forests and has appointed separate Office bearers from within the Mahila Samiti for the same. The operational part of the forest protection is mainly overseen by the Mahila Samiti.

The case study tries to look at the unique emergence of the women led forest protection and the relationship of the women's group vis-à-vis the other power centres in and close to the community. It also illustrates the problems faced by a comparatively smaller community in trying to control erstwhile open access resources like forest and the ingenious strategies, which can emerge out of such efforts. The role of the legal holder i.e. the FD and the fact that it tries to

protect its own interest and that of the other more powerful actors at the expense of the poor is also brought out in the case.

Location of the Village

Bhaghamunda village is located in the Barkote block of Deogarh District. It is included in the Kandhal panchyat. The village is located close to the National Highway No.6 (NH 6) and is surrounded on the north by the Badtoila RF and in the east, south and west by villages and small patches of forests. The Village lies in the foothills of the Badtoila RF. The other villages close to it are Chandankhunti and Koshibahal (in north across the hills and the NH6), Samarkhai & Kandhal in the east, Kantapali, Goudnali and Nuagaon in the south-east, Poinpani in the south and Rengalbahal in the west. Out of these villages, Chandankhunti, Koshibahal, Kandhal, Kantapali, Nuagaon, Poipani and Rengalbahal are involved in protection of their own patch of forests.

The village has undulating topography with three patches of bunded paddy lands along streams originating from the hills to the north. Some uplands lying between these streams have also been cleared and are used for taking pulses etc. on a fallow basis.

Rest of the village is covered by forest growth, which extends into the RF area. The Social forestry plantation has been taken up in the revenue area of the village settlement in 25 acres of land.

Village history:

The village is an offshoot of Kandhal village (about 2 kms away).By 1905, some patches of land in the reserve forest area had been developed as agricultural fields by few people from Kandhal after obtaining the permission to clear forests for agriculture from the Zamindar. Later they settled down near their fields after obtaining permission from the Raja (in later 1920s).

At the time of first settlement the area had dense and thick forest populated with wild animals. It was initially called *Bhangamunda* (emaning broken bunds) due to the rampant erosion in the area. However later the King of Deogarh named it Bhaghamunda (tiger hill) after killing a tiger in the area in 1930.

An interesting belief of the villagers is that only people of Gond tribe could settle in the village. This was strengthened when the villagers invited a Goud caste (cowherd caste) person to settle in their village and look after their cattle. The family settled in the village but all the children born in the family died. The couple left the village and settled in a neighbouring village and has four children. Thus no other caste /tribe have settled in the village allowing it to retain its unique homogeneity.

Composition of the village:

It is a homogenous village inhabited by 26 Gond households.

Livelihood and occupations

The villagers are primarily dependent on agriculture , collection of NTFPs Kendu leaves and Mahua flowers and wage labour to sustain themselves all year round. The amount of agricultural land with the villagers is less with a total patta (legally owned) land of approximately 25 acres and additional encroached land of 35 acres (Annexure 5). However, some HHs from the neighbouring villages such as Samarkhai (resettlement village of Rengali dam oustees) own agricultural land in the Baghamunda village. The agriculture is primarily rainfed with paddy as the main crop. Recently two families have taken up vegetable cultivation. The village has two small water tanks where water is available the year round.

The agricultural land distribution is not very skewed with maximum legal landholding being only 4.12 acres. Persons not having patta land have encroached small areas, thus no one in the

village is completely landless. However the productivity is very poor and not sufficient for the whole year. The villagers supplement their food requirement by tubers, leaves and fruits from the forests. They also obtain additional income from the Non timber forest products collected from the forests.

The NTFPs form the second most important source of income as well as subsistence after agriculture. The main NTFPs collected for sale are Kendu leaves and Mahua flowers. Agriculture labour in the nearby villages is also an important source of income. Villagers sometimes migrate for casual labour like road works and to work in coal mines to Kalahandi, Talcher, Bargarh, Mayurbhanj, Bhubaneswar etc.

VILLAGE PROFILE: TALBAHALI

Village	:	Talbahali
Post Office	:	Kuliposh
Police Station	:	Lahunipada
Gram Panchayat	:	Kuliposh
Block	:	Lahunipada
District	:	Sundargarh

Location of the village:

This village does not enjoy considerable infrastructure facility to access it. It can be accessed from Lahunipada on a State highway joining to Keonjhar. On the highway approximately 10 Kms from Lahunipada towards Keonjhar, there is a metallic road from Lalei to Khandadhar joining it. It is 6 kms east from Lalei on the same road. This village can also be accessed NE of Khuntgaon through a road joining from Khuntgaon to Kuliposh after a distance of 4 Kms.

Surrounding villages: -

There are six different villages surrounding this village (please refer to the village resource map). The surrounding villages with their respective direction and distance with reference to Talbahali are as under :

Surrounding villages	*Distance (in km)*	*Direction w.r.t Talbahali*
Bijaghat	2 Km	W
Arjunajhari	0.5 Kms	W
Baraguda(Bahragurha)	0.5	S
Kardakudar	2 Kms	N
Deogharia	0.5 Kms	E
Budhabhuin	2 Kms	E

Village Talbahali draws significant attention alongwith its surrounding villages due to the exquisite tourist spot of Khandadhar waterfall. All its hamlets are situated on both sides of the road joining lalei and Khandadhar

Historical importance of the village:-

This village draws some historical importance due to supply of good quality of lac during princely period. Talbahali was supposed to be the centre of lac production along with its surrounding villages. During 1930 AD, higher social caste such as " Mahanta" were involved in lac trading to Ranchi. Villages both Talbahali and Budhabhuin were considered as the supplier of superior quality of lac to Ranchi via Bimlagarh, Barsuan and Rourkela. Prior to 1930 AD, supply was channelled to Ranchi via Lahunipada and Rourkela The trader had to pay royalty to the king. As per villagers' perception, smuggling of lac was also existing. The trader usually dressed in the form of a bridegroom was accompanying the "Handi" (containers containing lac) to higher market

to get rid of the royalty paid to king. Bridegrooms were usually accompanying the sweets after their marriages. Earlier, lac was sold in local units known as "*Mahana*" (1 *Mahana* equals to 40 Kgs of lac today).

The erstwhile king Dharanidhar Deo has helped in settling other higher caste people from Chakradharpur and Dhurkundi region of Bihar. Before establishment of other castes in this village, this village was a completely homogeneous with Bhuyan tribes residing there. After 1930 AD, Mahants arrived from region, with other social categories from surrounding villages, Talabahali gradually turned into heterogeneous.

During princely period, this village was also noted due to kings' garden where fruit yielding trees such as Mango, Jackfruit, Lemon, Plantain, Guava, Orange, Litchi were planted and taken care of. The garden is still existing in rudimentary form. This garden was handed over to the Govt. of Orissa in during 1978.

Among others, "Baba-Math" - sages' place has also considerable importance from cultural point of view. This was regarded as the holiest place where Bhagawat (mythological) recitation was done in every evening. Village problems and conflicts were also solved there. Presently it lost its importance and all conflicts, other village problems are discussed and solved in "Baruni Chetana Kendra" (Forest Awareness Centre) situated in the heart of the village.

After Independence, village Talbahali was the only education centre existing in this region. The school level education upto Middle English standard were given here. The school is the oldest govt. ME school in this area.

Caste composition:

Tab-1.7 Castewise distribution and their representation

Sl. No	Castes	No. of HHs	% representation
	Upper Social Categories		
1	Mahanta	5	5.81
2	Mahakula	12	13.95
	Scheduled Tribes		
3	Kolha (Munda)	14	16.27
4	Bhumij	10	11.62
5	Lahura	7	8.13
6	Bhuyan	21	24.41
7	Oram	2	2.32
8	Christian munda	15	17.44
Total		86	100

The village composition in terms of castes indicate that existing village is a heterogeneous in nature having the dominance of Bhuyan tribes which represent almost one fourth of total HHs of entire village. Bhuyans were earstwhile were the sole inhabitants of this village. The tribal households in comparision to the entire village constitute almost 62.75%. On the other hand, the so called "upper social groups" constitute 19.76% of total village house holds. Christian munda are not native to this village. They have been migrated from Singhbhum and Chaibasa region of Bihar. The migration still continues even today.

Mohanta caste designate them as " Khyetriya " (the warriors) and Mahakula as Gauda (Milkmen).

Occupation of the villagers

Analysis of tab-1.8 reveals that:

1. Agriculture is not the primary occupation of all castes. It is so for the "upper social categories" who own registered land minimum 2-3 Acres. Agriculture meets the livelihood dependency upto complete one year.

2. Collection of NTFPs from the forest plays considerable role in many caste groups. It provides subsistence up to 4 months of a year.
3. All scheduled Tribes have selected wage labour within and outside their village as a means to supplement their occupation. They remain as "Bhutiyas" (wage labourers) for the higher caste people in most of the year.
4. Podu cultivation (slash and fine method) is still being practiced by the ancient inhabitants of this village such as Bhuyans. Presently, Bhuyans own very low registered lands hence, the usual cultivation in their registered lands. Podu cultivation is traditionally practiced over generations. The Christians migrated from Singhbhum, Chainbasa prefer to stay within the forest by encroaching the forest area. Since, they do not own any registered land, they prefer to podu cultivation. Usually, they seize the forest cultivated land being used by Bhuyans. Usually, Bhuyans practice Podu cultivation for one to two years which is later encroached by the christian tribes.

5. Besides above mentioned livelihood means, Caste wise occupations also play considerable roles. The Luhura (Blacksmith) caste supplement upto 5 months of annual earning through its castewise occupation such as making iron implements for agriculture.

Table: 1.8 Primary, Secondary Occupation with respective periods of dependency of different castes, Talbahali.

Sl. No	Castes	Primary Occupation	Secondary Occupation	Period of dependency	
1	Mahanta	Agriculture	1. Forest Product collection 2. Country liquour (handia) preparation of self consumption	1 year	
2	Mahakula	Agriculture	1. Wage labour within village 2. Cattle grazing round the year (3HHs)	4 - 8 months	4 months
3	Kolha	1. Wage labour 2. Seasonal migration to Talcher, Barsuan, Paradip, Lathikata, Khandadhar, Kamakhyanagar, Patna (Bihar)	1. Agriculture 2. Collection of NTFPs	6 months	2 months 4 years
4	Bhumij	1. Agriculture 2. Mahuli (country liquour from Mahua flowers preparation) 3. Wage labour within & outside village	NTFP collection	4 months 4 months 3 months	2 Months
5	Lahura	1. Preparation of Iron Implements 2. Wage Labour	Agriculture	5 Months 5 Months	2 Months
6	Bhuiyan	1. Podu cultivation (Shifting cultivation) 2. Wage Labour (Primarily women)	1. Agriculture (in own registered land) 2. NTFP collection	6 Months 3 Months	2 Months 2 Months
7	Oram	1. Agriculture 2. NTFP collection	Wage labour	6 Months 4 Months	2 Months

8	Christians	1. Agriculture 2. Podu cultivation	1. NTFP collection 2. Wage Labour	4 Months 4 Months	2 Months 2 Months

Tab1.9: Hamletwise Caste distribution with respect to their no. of HHs

Sl. No	Hamlets	Castes Present	No. of HHs
1	Talbahali	Mahanta Mahakul Luhura Kolha	5 3 3 1
2	Bhuyan Sahi	Bhuyan Christian Kolha Mahakul	16 5 2 1
3	Bhumij Sahi	Bhumij Luhura Mahakul Bhuyan	10 4 4 5
4	Tungrutola	Christian Oram Mahakul Luhura	10 2 4 2
5	Deogharia	Kolha	12

Tab 1.10: Dependency on forest (Castewise)

Sl. No	*Castes*	Degree of Dependency	Dependent for
1	Mohanta	Low	Mahula, Tol, Kusum seeds, Lac
2	Mahakula	Low	Mahula, Tol, Kusum seeds, Lac
3	Kolha	High	Mahual, Tol, Kusum seeds, Kendu leaves, Pala leaves, Mushrooms, tubers
4	Bhumij	Moderate	Mahual, Tol, Kusum & Kendu leaves
5	Bhuyan	High	Mahula, Tol, Kusum seeds, Pitalu tubers, Bainga tubers, Sainga tubers, Pudhei fruits, Mushrooms Kai ants (read ants), Honey, Jhuna (Sal latex), Kendu leaves, Kusumi lac, Kendu fruits, Char fruits, Mangoes, Baidank seeds.
6	Oram	Moderate	Mahula, tol, Kusum, Kendu leaves, Pala Leaves
7	Christians	Moderate	Mahula, Tol, Kusum, Lac, Pala, Kenduleaves, Karanj seeds, Neem seeds
8	Lahura	No dependency	

Castewise dependency on forest:

Mahanta and Mahakula:

Mahula flowers are collected for trading. These households own some Mahula trees in their private lands. Besides, considerable density (Visual estimate) of Mahua trees are noticed in the forest lands. The Bhutiyas (wage labourers) as employed by them are used for Mahula flower collection. It is estimated that 20% of total Mahula flowers collected are used for fodder purposes and the rest amount stored for off-season trading. During Mahula flower collection season, oftenly Mahua flowers are purchased within and from surrounding villages. These are stored and sold to godowns at Lahunipada during off-season. Last year Mahua flowers were sold to godowns @ Rs. 7.00/Kg during September t- November. After the collection season, Mahua flowers are also sold to Bhumijs in retail for liquor (Mahuli, country liquor made from Mahua flowers) brewing at the above-mentioned rate. Mahua seeds are collected for oil extraction which is used for self

consumption. Oftenly, Tol oil is also used for body message. Kusumi lac is cultivated in their own private trees.

Kolha :

Mahula are collected and sold after drying and processing during the collection season itself. Unprocessed Mahula seeds & Kusum seeds are also sold in the local market (selling price of Tol was Rs.5.00/Kg (1999) and Kusum seeds Rs. 2.25/Kg (1999)). Guestimates indicates 80% of oil seeds collected are released to the local market for cash and 20% are utilised for self consumption. Kendu leaves and Pala (wild variety of date palm) leaves are also collected from agricultural bunds and forests. Kendu leaves are sold to the Phadi and Pala leaves are used for weaving sleeping mats. It is sold in Khuntagaon market @ Rs. 160.00 - 170.00/ mat during November-December.

Bhumiji:

Collection of Mahula, Mahula seeds (Tol), Kusum seeds and Kendu leaves are the prime collections done by these caste groups. Tol and Kusum seeds are collected and sold raw in the nearby Khuntagaon market. Mahula collection is comparatively lower than other castes groups. They rather prefer to brew the Mahua flowers by purchasing during and after Mahua collection season. The reason is due to the fact that Mahuli making is more profitable compared to Mahula collection and selling. Brewing of liquor is noticed high during agricultural and other festive seasons.

Bhuyans:

Bhuyans have inherit their tribal tradition over centuries and preserved it. Their absolute dependency on forest is quite evident from their mode and method of agriculture and collection of varieties of Non Timber Forest Products (NTFPs). Of all castes groups, the Bhuyans collect varieties of NTFPs (refer tab-4). Mahua flowers collected are sold in the nearby market as a whole after drying and processing. Mahua seeds and Kusum seeds after drying are also sold in the market for cash. However, roughly 10% of total Mahua seed collection are expelled for oil which is used for self consumption purposes. Varieties of tubers such as *Pitalu*-tuber, *Bainaga*, *Sainga* are collected during August-September and sold in the market.

Pita-alu tubers are processed before selling. Processing is needed due to its extremely bitterness. On the other hand Bainga and Sainga tubers are dug out and sold directly in the village / local market without any processing. All tubers are usually exchanged @ 1:1 ratio with paddy.

Pudhei fruits are collected from the forest and primarily sold. Rarely consumption leads to 5% of its total collection.

Mushrooms collected from forest are mainly consumed (60%) and remaining are sold in the Khuntagaon market. The mushrooms are sold @ Rs. 8.00 / kg. However, the demand of mushrooms in the market are comparatively low due to plentily availability inside forest which all villagers tend to collect it.

During rainy days, Bhuyans also collect insects locally called *"Kalei Poka" (Jhadipoka)* for consumption purposes. The insects are collected and is delicious to eat which is loved by all villagers. Roughly 20% of insects are consumed by the Bhuyans and rest are exchanged with paddy at the rate of 1Kg rice=1Kg of insects (approximately) within village.

Similarly, during summer and winter season, Bhuyans collect red ants (Kai ants) and exchange in the local market. It is exchanged @ 1 Kg of rice=1 Kg of red ants. Honey is also collected and sold in the local market (Khuntgaon) @ Rs. 60.00/bottle (1 bottle = 900 gms). They also sell Jhuna (Sal latex) in Khutgaon market at Rs. 40.00/Kg. Kusumi lac is collected by them from other villagers @ Rs. 30.00 – Rs. 35.00 Kg and sell in Khuntgaon market @ Rs. 40.00/Kg. Kendu fruits collected from the forest and exchange in the Khuntgaon market @ 1 Kg of Kendu fruits = 1 Kg of paddy (existing rate of paddy = Rs 4.00 – 5.00 / kg). Char seeds sold @ Rs. 20.00/Kg. Mango

primarily consumed and sold @ Rs. 5.00/Kg. *Baidhank* seeds consumed and sold raw @ Rs. 6.00-7.00 / Kg.

Orams:

They collect Mahula, Tol, Kusum, Kendu Leaves, and Pala leaves. 5% of total Mahul collection are consumed as food and rest 95% are sold to the market. 15-20% of oil seeds collected are expelled for oil and rest are sold. Pala leaves are weaven to mats and sold during October – November in the Khuntgaon market @ Rs.100-00 –120.00 / mat.

Christians:

The NTFP collection by these groups quite resembles with the Orams. In addition, lac, Karanj and neem seeds are also collected. Christians are aware regarding the market value of Mahula, Tol and Kusum seeds. Hence, they store it and sell during the off season to fetch good market rate. Karanj and Neem seeds are collected and used for oil extraction completely. It is estimated that 3 Kgs of oil seeds yield 1 kg of oil. Oftenly, Karanj and Neem oil are exchanged for equal amount of Tol oil when in need.

Forest profile: Talbahali

Forest beat	:	Kuliposh
Forest Section	:	Kuliposh
Forest Range	:	Bonai
Forest Division	:	Bonai
Legal status of protected forest:		Khesra (Revenue Forest) & Demarcated Protected Forest (DPF)
Area of Khesra Forest	:	100 ha
Area of Demarcated PF	:	464.41 ha

The protected forest represents Northern Tropical Dry Deciduous Forest type having Sal trees as major crop. The common associates are *Asan, Mahul, Kusum, Kendu, Char, Dhoben (Dhuben), Raigachha, Bija, Daka, Gamhari, Anla, Harida, Bahada, Kurei (Kuluchi), Karda, Simili, Kurdu, Jamu, Khaira, Dhala (Dhaura), Chauladhua, Palsa, Charseria, Henna, Dimri* (All in the Khesra forest). Besides these species, Sisoo, Pudhei are other two species noticed in the Demarcated protected Forest. Besides naturally occurring species within the forest, *Chakunda, Acacia* and *Saguan* trees are planted by the Forest Department around the periphery of Khesra and DPF. Other shrubs include *Pokasungha, Dhatuki, Manj, Mathapatra* etc. *Achandi (Atundi), Dudhia, Pitalu, Saingia, Bainga, baidhunk, Siali, Vana Kundru, Vana kultha* and *Mahakala* are the climers present within the forest. Ground cover dominantly include *Bhuinimba (Chirayita), Ankranti, Van tulsi, Agnijhad, Van haldi, Van Saru, Bishalya Karani, Lajakuli, Eksiria, Premjadi, Khajuri Pala* etc.

General condition of the forest (visual observation)

As per visual observation, the forest from distance looks dense cover of vegetation with scattered patches of vegetation gaps - dominantly covered by shrubs (locally called as *Bombai lati*) and herbs. These forest gaps are the lands that have undergone of slash and fire for podu cultivation. visual estimate indicates approximately 10-15% of total protected forest area have under podu cultivation. Major crops of the forest such as sal trees alongwith its other associates are noticed to be healthy and of adult age group. The visual observation indicate that there has been low disturbance for timber extraction being done to the forest besides the interference by Bhuyan community for podu cultivation (shifting cultivation). The ground cover and undergrowth of the forest indicates a healthy growth. The undergrowth include shrubs, varieties of medicinal herbs, mushrooms etc. Limestone in the forest are seek scattered in and around the forest. The podu cultivated forest lands in the lower hills have undergone mixed cultivation with paddy and Gangei (Gangei is a wild variety of food grain). During October-November, Podu cultivated lands are exclusively used for blackgram cultivation. Bamboo in the DPF are unhealthy owing to extensive collection of Kardi (Yound bamboo shoots) The forest patch protected is entirely on hills.

Methodology

Initially a village meeting was arranged. In the village meeting with Village Committee (VC) members / Vans Surakshya Samiti (VSS) members / Village Forest Protection Committees (VFPC) members following aspects of the study were discussed:

- Objectives, methodology, outcomes and utility of the studies.
- Their perceptions regarding forest protection.
- Their traditional forest protection evaluation techniques.
- Process of forest protection initiation and outcomes till date.
- Brief background regarding type of forest, its area, its specific management (patchwise, if any), distribution of species, forest products, forest product flows and trading of products in the local markets.
- The concept of participatory monitoring of vegetation and their perceptions.
- PRA techniques were applied and brief information on diversity, seasonality, productivity of NTFP was collected.
- Concept of sustainable harvest and traditional thumb rule (if any) of sustainable extraction of forest products by the community.
- Economic evaluations of forest management.

From the village meeting, interested youths were chosen for vegetation and NTFP yield monitoring. Questionnaires written in Oriya for vegetation analysis, NTFP yield and NTFP harvest was provided to them. Next day was selected for a training programme on above aspects.

Researcher visited to these villages periodically and interact with those youths to investigate the proceedings.

Vegetation monitoring

Vegetation monitoring was done as per the methodologies mentioned in the EERN booklets. Different plots for different plant categories were laid in forest sites. Plot size of 50m* 50m was laid for tree measurements; 10m * 10m for shrubs and tree regeneration and 1m * 1m for herbs. Small trees were sampled in large tree quadrats. Well-formatted checklists (please see Annexure 3) were prepared and the data obtained were recorded for analysis.

Tree measurements

For tree measurements, girth at breast height (GBH), approximate height of the tree, Average canopy diameter, phenological characteristics, climbers/epiphytes on it and any other anthropological signs such as axe marks were recorded. GBH were measured at the height of 1.37m from the base of the tree. This was measured at the corrected height if there was some abnormalities at that height. Due to higher density of tree species in both type of forests no measuring instruments could be used for tree height and hence, visual estimate of the tree species was used. Average canopy diameter was measured by taking the average of two diameters being perpendicular to each other through tree trunk of the same tree. Number and type of the climbers and epiphytes were simply counted and recorded. Number of branches hacked were recorded for disturbance intensity

Tree regeneration measurement

Tree regeneration such as seedling and saplings were counted in 10m*10m quadrats. Tree regeneration such as seedlings and saplings were counted and recorded in the specific format. Seedlings were considered to that regeneration which is at or below 0.5m in height and as a thumb rule those regeneration, which are less than knee height were considered as seedlings. Those regeneration having girth less than 30 cm were accounted for saplings

Shrub measurement

As already mentioned, number of shrub bunches were counted and recorded. Similarly, number of sticks per shrub alongwith phenological characteristics was also recorded.

Herb measurement

Herbs were counted in 1m * 1 m quadrats and recorded.

Site characteristics

Prior to all vegetation measurements, general site characteristics were also recorded as per the format . Name, type and status of forest, forest profile, % of vegetation cover (visual estimate), % of ground cover (visual estimate), terrain, slope and direction of the hill, soil characteristics, presence of wild animals (from participating villagers), sign of cattle tramping, presence of cow dung/goat pellets and any other site specific characteristics were recorded.

Institutional assessments

Institutional assessments were carried out by discussing with the village committee (Gadabanikilo) or Village Forest Protection Committee (Karadapal) members. The changes over time in accordance with circumstances were stressed. Its structure, function, rules and regulations, election and selection of members, terms of Village Forest Protection Committees, rules pertaining distribution of forest products were assessed by talking with the committee members.

Data analysis:

Ecologcal analysis

Density, frequency, basal area of each tree species was calculated. Relative density, relative frequency and relative basal area were then determined and added to get the Important Value Index (IVI) to get importance of each species represented in each forest patches. Dominant species in each patches were judged for size class distribution.

From basal area calculations, Standing Woody Biomass (SWB) of each species and forest patches were estimated (tons/ha).

VILLAGE: GADABANIKILO

From the very beginning till today the forest protection in Gadabanikilo has continued through some institutional mechanism, i.e. informal as well as formal. It started very informally by a group of individuals, but got strengthened and formalized in course of time. Today, it follows specific rules for selection, election of members, penalty for the offenders, collection of fuelwood & other NTFPs and their equitable distribution, protection of the forest etc. Due to its capacity enhancement the committee, which started with the primary task of forest protection. It is also looking after other socio-economic & cultural activities in the village like the 'Raza' festival, village "Jantala" (mass feast), conflicts and other activities related to affecting the village life.

The following shows the steps through which the village committee has evolved to its present position:

- **1940 :** Ibrahim Khan, Nakula Parida, Udaya Nath Rout, Ram Chandra Parida, Kulamani Parida, Dhuli Parida, Govinda Chandra Paikray, Ratnakar Parida took initiatives for the protection of forest. As an immediate step, they declared Belabani, Khandia Bandha, Jhari Taila & Gadabandha Mundia as restricted area and allowed free access to Mahua Dunga. Thus, started the very first village committee of Gadabanikilo.

- **1943:** A "Yubak Sangha" (youth association) consisting of Jaba Khan, Jahu Khan, Dhuli Parida, Jagannath Rath, Naba Parida, Ramchandra Parida, Nabin Sahu, Fakir Parida, Khali Parida and Banamali Parida started celebrating the "Raza" festival involving the entire village.

- **1954:** The village committee was dissolved and a new committee consisting of seven members, viz. Digambar Rath, Dhuli Parida, Nakul Parida, Gobinda Chandra Paikray, Dambarudhar Parida and Bambradhar Barala was formed. Immediately after its formation the committee arranged for the first ever cleaning in the Tailamala forest.

- **1962:** New committee was formed consisting of Ramchandra Rout, Loknath Parida, Magi Parida, Somnath Rath, Loknath Parida, Ganesh Parida & Nimai Parida as its members.

- **1963:** Few members of the "Raza" committee died. Therefore, decision was taken to combine it with the village committee. The village committee took the charge of Raza, Dola, Jantala, Homa, conflict resolving, forest etc.

- **1973 - 1996:** Some new members were taken in the committee. The members are Nakula Parida, Magi Parida, Dambarudhar Barala, Ganesh Parida, Ramchandra Rout, Laxmidhar Parida and Purnachandra Rath.

Features of the Village Committee :

At present the eleven-member committee is looking after the affairs of the forest. Even though the villagers make no such distinction, as such, the eleven - member committee acts as the Executive body and the General Body comprises of all the adult members of the community. There are no fixed sessions for both the bodies to meet. However, the General Body sits 15 days before 'Raza' festival (in June) basically to decide the arrangements for the 'Raza' festival and to approve the income and expenditure account. However, it can meet any number of times in a year wherever its urgency is felt. The eleven - member committee (Executive Committee) meets once a week.

There is no fixed term for the Executive Committee.

The members are free to resign on their own or the General Body can decide to terminate membership of any member of the EC if he is found not to be discharging his responsibilities. When such a vacancy is there new members in the EC can be decided in the General Body. The membership is decided on selection basis and its number is not fixed. There is no participation of women in both EC and General Body

Present Village Committee members

Rama Raut (President), Padma Charan Raut (secretary), Lakhmidhar Parida, Murali Parida, Magi Parida, Harihar Martha, Ganesh Chandra Parida, Sarang Parida, Bainshidhar Parida, Duhshasan Parida and Wahid Khan

Eligibility of a member:

Four attributes were considered necessary for membership in the committee.

1. The member should articulate in public.
2. The member should have the ability to work towards the wellbeing of the village.
3. The member should be well versed in handling situations of conflict and resolving them.
4. The member should be of good character and integrity.

The members of the committee come from different economic classes. However the Khandayats have an overwhelming majority in the committee on account of their large population. A committee member is fined Re.1/- for not attending a meeting. Failure to attend 3 consecutive meetings, leads to the nullification of his membership.

FOREST PROTECTION SYSTEM:

Watching system:

The overall charge of the forest rests with the committee. However, when protection in specific is referred to, it is directly related to the watcher system, that is being followed. At present, there is only one watcher appointed by the committee. After a recent increment, the committee is paying him Rs.400.00 per month. He moves in the forest and keeps vigil over it. Any offender caught by the watcher is brought before the committee. At the time of Mahula collection and cleaning operations he plays a major role in selecting the patch and keeping watch on the entire operation. But at this point of time, since lease of the entire forest is given to single household, and he collects Tola (Mahula seed) with the help of the selected households, there is no need of the watcher, because the villagers collect from entire forest daily. The committee will select the new watcher soon after the Tola collection is over.

Previously there was only one watcher who was appointed in 1950. Later during the year 1962, another watcher joined. In 1996, one of the two watchers Shri Nakul Parida resigned due to his old age and the committee has appointed a new watcher. During last two years, only one watcher has been appointed to this process. For the year 1998 – 1999 Shri Rama charan Parida was appointed but he was kept out from watching as he could not watch properly.

Penalty:

There are no specific/fixed rules set for punishing the forest offenders. However, the committee has evolved a set of informal rules and regulations which adequately explains the penalty system

As it goes from the very beginning the committee fixes or decides a fine amount to be collected from each offender which varies from case to case. The committee may also excuse an offender if the members so decide.

Recently the committee members have strengthened penalty system for illegal timber cutting from the forests. The penalty amount depends on type of timber harvested. Legally, the committee doesn't permit anyone to cut any timber from the forests besides in exceptional cases.

The records of the fine book maintained by the committee gives the total number of offence cases in a particular period of the year. The penalty books are loosely maintained and it only shows the cases for few months in the year. There is only mention of the date, name of the offender, father's name, nature of offence and the forest patch where offence has taken place. There is no

record of the amount of penalty imposed for individual case. A brief summary of the cases of violation of the regulations between 1991 to 1996 is provided in Table 2.1 in the annexure:

Timber type	Fines charged (in Rs. per log)
Piasal	10,000
Patuli	1,000 to 1,500
Kalasahaj	5,000
Tinia	10,000 to 15,000
Kochila	500 to 1,000
Giringa	50 to 100
Mahula	Never cut

Table 2.1: Total number of cases of misuse and their nature

YEAR (Period)	FUELWOOD	MAHUA	TEAK	OTHER	TOTAL
1991-14.11.91	13	1	1		15
1992-1.1.92	167	3	1	13	184
1993-17.9.93 to 2.10.93	101	-	-	52	153
1994-11.7.94 to 18.10.94	102	9	1	16	128
1995-5.9.95 to 5.12.95	35	-	-	4	39
1996-1.1.96 to date	106	-	-	16	122

Analysis of the six years' offence cases shows the trend towards growing dependence on fuelwood that is not being met sufficiently through the provisions of the committee for taking fuelwood from the forest. Number of cases relating to the cutting of big trees is less as compared to the total number offences relating to fuelwood.

Rules & Regulations:

This can be divided into the following categories:

1. Rules pertaining to the collection and sharing of Mahua flower and Seeds from the entire forest.
2. Rules for patches under cleaning.
3. Rules for the use of "Padar" patch.
4. Rules pertaining to grazing.
5. Rules pertaining to "Sanskar" (Cremation).
6. Rules with regard to free and restricted access in various patches of forest.
7. There are even rules which specify the species which can be cut and which can not be.

Production and distribution system

Mahula (Mahua)

Mahula (Mahua flower) and Tola (Mahua fruit)is the largest forest produce is a valuable resource for the entire community The Mahula is collected form the entire forest.

The village committee has made a different set of rules for this patch of forest. There is both **restricted and free access** in the patch. Restrictions are imposed on cutting of Mahula trees and specific rules are there for collection and sharing of the produce.

Seasonality of Mahula :

Mahula flower is available in the months of March and April. Mahua Seed ripens and is ready for collection during the months of May and June.

Collection & Benefit Sharing:

There is no specific rules pertaining to the collection and sharing of Mahua flower. All the 143 households are free to go to the forest and collect Mahua flowers during the season. However, the only rule is no one can collect flowers directly from the trees. It is only the flowers which fall on the ground are collected.

But, there are well-defined and specific rules with regard to the collection of Tola (Mahua seed). The systems and rules are as follows:

1. 145 households are equally divided into 4 blocks.
2. The VC decides the date for the beginning of collection season.
3. Usually only one block is allowed to collect on a given day, but during good harvest years two blocks are allowed to gather Mahua Seed from the forest on the same day. The first block is allowed to go for collection on the first day and subsequent days are followed for other groups. This process continues in a cyclic manner.
4. One member from each household is allowed to go for collection.
5. The committee members direct the block to collect Mahula seeds from the edge of the forest.
6. The timing for collection is from 6 A.M. to 11 A.M.
7. 15 members from the block stay in patrolling duty for that day after completion of the collection work. The remaining 15 members of the block do it in the next turn of the block for collection.
8. The day's collection is brought to the *Bhagabat Tungi* (traditional place of religious discourses, especially on the Gita). Each individual deposits half of his collection to the village common pool.
9. At the end of the season the entire amount of Mahula seed, accumulated in the common pool is distributed equally among the 145 households. This enables the equity between the villagers. Those households who do not go for gathering get their share.
10. If a particular household is unable to collect he/she has to hire a labour for collection. Collected seeds are shared 50:50 between the HH and labourer.

This year, collection of Mahula seeds were not followed as per usual mechanisms due to low Mahua seed production. Hence, village committee had leased all Mahula seeds to one HH who collects with the help of few selected households. After it is collected, it is deposited at a common point in the village. The collector gets its share from the lease holder @ 50 % of total collection. Each selected household has to collect atleast one *Nauti* (traditional measuring unit which equals to 6 kgs). This year, the lease holder has got the lease for Rs 2000.00 for the entire village.

An estimate by the villager shows that usually 40 households get involved in the collection of Mahula flower. They collect between 30 Kgs to 1 Qtl. Around 7 households collect 1 Qtl. and the rest collect 30 to 50 Kgs.

Similarly, each household collects around 50 Kgs of dry Mahua seed in a particular season. Each of them extracts two tins of Mahula seed oil (Tola oil) for own consumption during good crop year. They sold Mahua seed at Rs.10/- per Kg (1998) and Tola oil at Rs.30/- , 36./- per Kg (1998). Mahula seed oil (Tola oil) are now a days are exchanged with mustard oil depending on their need.

Similarly, during the year 1996 decision was taken by the General Body to lease out the Mahula Seed collection. Magi Parida, watcher, got the lease for Rs 1500/- in partnership with 14 persons in the village The reason for giving out Mahula seed on lease was that the quantity of flower was

less and it was felt that if all the households were allowed to collect there would not be sufficient Mahula seed to collect. The leaseholder's record shows that they collected a total of about 15 Qtl.. Another 10 to 15 Qtl. has been collected clandestinely by the villagers.

The records of 1995 shows a total of 56.80 Qtl. of Mahua seed were collected through block method.

In 1997 the average share of Mahua Seeds have been about 40 Kgs. per collectors household. The share per non-collectors' household had been roughly 20 kilos.

Cleaning[1] patch (forest):

Forest protection in Gadabanikilo had its origin from the non-fulfilment of the basic forestry needs / requirements of the villagers, fuelwood being the foremost amongst them. Therefore, the VC has made elaborate arrangements with regard to fulfilment of basic forestry needs fuelwood in particular. Specifications regarding *cleaning operations* in different forest patches are another set of arrangement for meeting fuelwood requirements of the villagers. A reflection of this can be seen in the decisions of the very first committee in the year 1940. *i.e.* few patches like Belabani, Khandia Bandha, Jhari Taila, Gada Bandha Mundia were declared as restricted and Mahula Dunga (Reserve forest patch) was kept as free access area for meeting firewood requirements. This arrangement continued for 14 years till the first cleaning operation was undertaken in the Tailamala forest in 1954. Cleaning is done twice in a year, viz. before rain & immediately after agricultural harvest. This cleaning operations rest with the VC.

Subsequently, few more forest patches were reserved for the purpose of rotational cleaning, viz. Padar, Belabani Jungle, Tailamala, Khandia Bandha, Jharitaila etc.

Rules pertaining to cleaning and distribution:

In the cleaning system of different patches the same block method is used as in the Mahua patch. Two persons are allowed from each household and one block is allowed only one day per year for collection of cleaning outputs. They thin prune the tree branches, cut and clean the shrubs from 7 a.m. to 12 noon. They are free to take whatever material is collected during that period of time. Subsequent days are allowed for other blocks to clean and collect their cleaning out puts. Those households, who are unable to collect during their turn, all non-collecting HHs are allowed to collect on the fifth day only. If they are still unable to collect, go on the fifth day, they have to loose their turn for the entire year. Specific and separate/plots are allotted to each during cleaning of forests.

Till 1995 the Committee collected Rs 2/- per cartload of collected fuelwood material. The charges were hiked to Rs 15/- per cartload in 1996 in order to meet the requirement for salary of the watcher.

These rules apply equally to all the forest patches where cleaning operation is carried out.

Based on their experience, the villagers estimate that an area of 12-15 acres are required for cleaning operation at one time to meet the fuelwood requirements of the entire village.

Timeline of cleaning operations and the forest patches cleaned :

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[1] Cleaning refers to a sort of forestry operation which involves cutting/cleaning of he ground cover (less important or non required species) and thinning and pruning of trees which have over grown in order to facilitate regeneration. Villagers widely use this word 'cleaning' whenever they cut tree branches or collect fuelwood in large scale by cutting unimportant species, sizing the grown up trees or similar activities. However, the committee has made a list of species which can be cut and which cannot. In the case of Gadabanikilo cleaning is taken up for large-scale collection of fuelwood. The committee fixes up the norms of such operations. The general rule being that no big green trees, or branches of it can be cut. Only specified species can be cut at any stage. For other species only dead, dry, diseased or adversely competing trees or branches can be cut.

1985	:Middle of Belabani Tailamala forest and Padar.
1986 to1990	:Forest near Godabandha on the left-hand side of the road and Padar. Kadalibadi forest near Sanapathuria.
1991	:On the north of Kaianhuda forest near Tailamala and to its extreme north in the second cleaning.
1992	:Near Kaianhuda forest of Tailamala and its adjoining forests in the second cleaning.
1993	:Tailamala forest and nearer to Kaianhuda forest.
1994	:Khandiabandha Talaberana and Uparberana forest.
1995	:Khandiabandha Uparberana forest and Belabani.
1996	:Belabani
1997	:Godabandha
1998	:Godabandha

The total area of forest under the Cleaning patch is 235 A (94 ha) approximately.

Padar patch (forest):

"Padar", as the term indicates, means, "an open space" without any dense cover of vegetation. Gadabanikilo village has a patch of Padar on an area of 55 acres, which is on the north of the village and at a distance of 1/2 Kms. from the village. It is situated on revenue land.

Till 1945 there were various species of vegetation present here, *Pterocarpus marsupium, Diospyros melanoxylon, Strychnos nuxvomica, Emblica officinalis, Terminalia chebula, Terminalia bellerica, Buchanania lanzan, Diospyros sylvatica, Zizyphus spp.*, Tundupoda, Banabanka Kanta, Kaniari, Kanta Baula, Kala Sahaj being the dominant.

However, there was massive degradation of this patch as people from villages like Khairpalli, Sanapaturia,
Badapaturia, and Giridharpur interfered in it and even rootstocks were not spared.

At present, the Padar patch is full of shrubs and thorny bushes with sparse density of *Madhuca indica* & *Mangifera indica* trees in some blocks of it. A rough estimate by the villagers shows that there are about 1000 Mahua trees and 500 mango trees present in the entire Padar patch.

Cleaning & sharing:

Since there are only thorny bushes and other similar species present in the Padar, it is suitably used for fuelwood purpose only. Cleaning is done on rational basis. *The rules pertaining to cleaning and distribution are applicable to the cleaning of Padar also.*

As the villagers recollect, the Padar has been brought under cleaning operation thrice, i.e. in 1970, 1980-81 and 1985 but clandestine removal are quite evident from this forest.

Other uses of the Padar :

Besides cleaning materials, the Padar also caters to other basic requirement of villagers like, it provides space for graveyard.

On the North the Padar is surrounded by the bamboo forest and mango groves of Sanapathuria village.

Grazing system:

Grazing is one of the most traditional activities which the villagers of Gadabanikilo have retained till today. This is a yearlong activity that at present, takes place through seven groups of grazers in the village. There are four cowherds and three herds of goat and sheep. The grazing year starts from the "Dola Purnima" (Holi). Though there is no such rules making this activity caste bound, it is seen that mostly "Gauda" (milkmen) and "Sabara" (tribes) people take up this activity.

The entire forest patch that belongs to the village Gadabanikilo is free for grazing. However, the uncleaned patch is not found to be the grazing site due its greater density and quite difficult to enter into it. There are about 500 cows and 1000 goats (at present) and 30 sheep in the village who depends on the forest for grazing. The timing of grazing is from 9 a.m. to 5 p.m.

The grazers charge in the following manner which is payable in instalments:

- Cow with calf — 8 Gouni (28 kg) of Paddy
- Cow without calf — 7 Gouni (24.5 kg) of Paddy
- Calf — 3 Gouni (10.5) of Paddy
- Goat and sheep — 6 Gouni (21 kg) of Paddy

(local units, 1 Gouni = 5 Ser, 1 Ser = 700 gm approx.)

Forest patches and routes for grazing : The following are the routes and forest patches where the grazers take the cattle :

Routes

I Karkacha matigadia - school field - Kaju field - agricultural field - Aambajhar and back through the same route.

II Karkacha matigadia - Kochilapatna - Mahua forest -Baunsabani and back.

II Karkacha Matigadia - Mahua forest - Benagadia - Khuntabandha and back through the same route.

IV Karkacha Matigadia - Gotha Berna Jami - Belabani and back through Tailamala forest.

There is no such fixed rule for who will go in which route/direction. It depends which herd comes first to the *Karakacha Matigadia* and then in which direction it proceeds. The other herd will automatically go in the other direction and subsequent herds follow it. It is based on their mutual understanding.

The herds of goats and sheep go to the "Tangi" (barren land) because it is full of thorny shrubs (Bududukia Kanta). Besides, they also go to the Belabani and Padar. Apart from the fixed routes the cowherds also go to Tailamala, Belabani, Benagadia Dunga, Jaritaila Padar, Bhuine Mundia Padar and agricultural fields immediately after harvesting. During summer season the herds go to the "Aambatota" (mango groves) during mid-day. They also go to the nearby village forests of Kochilapatna, Khuntabandha, Durgapur, Aamjhara, Sanakila etc.

Who come to Gadabanikilo forest for grazing :

A number of herds from other villages come to Gadabanikilo forest for grazing for 5-7 days in a month. The villages to which they belong are Aambajhara, Sanakila, Gouda Patna, Dobha, Sanapathuria, Gunduria and Khairpalli. On the whole, the Gadabanikilo forest supports approximately 2500 cattle with varying levels of dependence.

"Sanskara" system :

The most disturbing experience of the villagers of Gadabanikilo during the days of forest degradation was non-availability of wood for funeral pyre. At present, the VC has framed rules pertaining to the wood requirement for funeral. Species like *Benta, Narigini* and *Telakarhuan* catch fire easily and can be used almost directly after being cut. Therefore, the VC has reserved these species exclusively for the purpose of funeral.

A person requiring wood for funeral can take any of these species directly from the forest without informing the VC. The quantity of wood is not fixed and it depends on the required quantity. The VC also allows the nearby villages to take wood for funeral with its permission.

Free and restricted access :

There is free access in the entire forest as far as the collection of NTFPs, except Mahua (flower of *Madhuca indica*) and Tola(fruit and kernel of *Madhuca indica*) is concerned. Surrounding villagers also collect these items from the Gadabanikilo forest. This year, tribal women have collected Char seeds from this forest which made aware of its economic value of this invaluable forest product. However, there is restriction in the same patch with regard to cutting of big trees and collection of fuelwood. Therefore, the protection and management of forest in Gadabanikilo is maintained through both free as well as restricted access mechanisms.

Table 2.2: Protection of tree species from felling:

Can be Cut	**Can't be cut**	
Cassia fistula	*Aegle marmelos*	*Lannea coromandalica*
Combretum decandrumm	*Azadirachta indica*	*Madhuca indica*
Diospyros sylvatica	*Cassia fistula*	*Pterocarpus marsupium*
Smilax macrophylla	*Diospyros melanoxylon*	*Pterospermum heyneanum*
Zizyphus oenoplia	*Emblica officinalis*	*Semecarpus anacardium*
Tela Kerhuan	*Lagerstroemia parviflora*	*Streblus asper*
Firika	*Lagerstroemia reginae*	*Strychnos nuxvomica*
Jhadapan	Jayasandha	*Syzygium cumini*
Kukurchelia	Jhadapan	*Terminalia bellerica*
Other shrubs	Kala Sahaj	*Terminalia chebula*
Pokasungha	Karada	Mungai

Trees in the "cannot be cut" category can also be cut during the cleaning operation if they are found to be dead, diseased or deformed.

VILLAGE: KARADAPAL

Village Karadapal is one of the villages in Keonjhar which show quite interesting forest protection properties. It has its own village forest protection committee called as Karadapal Forest Protection committee (KFPC, in brief). Along with other five surrounding villages the villagers are protecting a common forest Reserve Forest, locally called as *Atei* Reserve Forest of approximately 12,000 ha in area. All *Atei* Reserve Forest protecting villages (including Karadapal) belong to three Gram Panchayats.

Gram Panchayats	**Villages**
Dhoradiamba	Jampasi
Bhagamunda	Badakhaman, Sirispal, Nuagaon
Sagadapata	Hatikucha

All these villages have formed a Regional Forest Protection Committee (RFPC, in brief) to protect the common forest. Atei forest is protected by the surrounding villagers and villagers extract direct benefit from the forest.

KARADAPAL FOREST PROTECTION COMMITTEE (KFPC)

Origin of KFPC

The villagers of Karadapal,have started forest protection since 1975. During same year, they formed village committee to look after the village welfare. Different issues raising from conflict resolution to betterment and development of the village through its resource management are

discussed in the village meeting. Often the villagers faced forest issues. Most of the benefits were extracted from the village forest resource and livelihood is based on it. However, many times illegal timber felling was quite evident. Villagers are also responsible for forest degradation assuming forest resource to be highly inexhaustible. Mostly the tribes (*Sabara*) have made their illegal profession on timber cutting and selling them in the market randomly. Unawareness of future consequences of forest degradation led the forest to be gap dominating and density of trees had started decreasing drastically. Thus, there was an immediate need of forest protection initiation through this village committee. During village committee meeting (1975), it was realised that irrespective of any species and any girth class, felling never stopped. Mostly timber species such as Sal (*Shorea robusta*), Piasal (*Pterocarpus marsupium*), Asan (*Terminalia tomentosa*), Sisoo (*Dalbergia latifolia*), Bandhana (*Ougenia dalbergioides*) cutting were meant for firewood purposes and frequently sold at Anandpur (one of the local markets surrounding this village). Villagers without realised loss of some of the important timber (drastic reduction of tree density of Piasal) and non timber species (such as Gardi - gum has high commercial value).

As in case of Gadabanikilo, although there was no such incident that triggered immediate attention towards forest protection, green patches gradually turning into barren lands led to think some conscious people towards its initiation of forest protection. After few years of protection, this was further facilitated and strengthened by the involvement of a voluntary organisation named *Keonjhar Integrated Rural Development and Training Institute* (KIRDTI), Harichandanpur, Keonjhar. KIRDTI on January 6, 1992 organised a rally towards forest protection programmes in entire Keonjhar district. But prior to it, the villagers of Karadapal had already started protecting their forest and as per peoples' perception, Karadapal is the pioneering village in protecting the village forest resource. Karadapal Forest Protection Committee (KFPC) is protecting the village Revenue Forest (150 acres) under their possession.

Objectives of KFPC:

The committee was formed on 24th January,1991 in presence of Bhagamunda and Harichandanpur forest guards (reason of forest guards' presence in their committee formation was to prevent the illegal bribes, forceful accumulation of rice and money taken from the villagers by the forest guards towards their duties for forest protection) keeping in following objectives:

- Responsibility of complete forest protection of both Revenue and Reserve Forest (earlier they have taken the initiatives also to protect the Reserve Forest which later they have transferred to RFPC).
- Plantation of fruit yielding species in the *Khesra* (Revenue Forest) and along the roads.
- Strong penalty system to prevent the wood cutters from cutting wood for firewood selling.

Secondary responsibilities:

- Regular meeting for cleaning Kaju (cashew-nut) field during harvest and responsibilities sharing for watching the field during Kaju harvest.

Committee structure:

Committee members are found to be tribal dominated and reservation for women (20 % of the total members)are evident. The older committee members are still intact and they did not change the committee structure. The members are:

Members	***Women members***
1. Shri Krushna Chandra Hannaga (Pre[illegible]nt)	Kumari Sumitra Dei
2 Shri Sushil Kumar Sahanya (Vice-pres[illegible]nt)	Kumari Gayatri Dei
3 Shri Lankeswar Dehuri	Kumari Lalbati Dei
4 Shri Nilamani Dehuri	Kumari Madhabi Dei
5. Shri Balaram Dehuri	Shrimati Gurubari Hannaga
6 Shri Harekrushna Dehuri	

7. Shri Shirapani Munda
8. Shri Sidio Munda
9. Shri Purnachandra Munda
10. Shri Berga Munda
11. Shri Durga Charan Munda
12. Shri Gamai Majhi
13. Shri Mangal Singh Majhi
14. Shri Subinath Munda
15. Shri Aiban Munda
16. Shri Pragana Munda
17. Shri Pandu Munda
18. Shri Paikaray Munda
19. Shri Madhu Munda
20. Shri Chandramohan Hannaga

At present Krushna Chandra Hannaga is replaced by Harekrushna Dehuri as Secretary and Shri Sushil Kumar Sahanya is elected as the president of KFPC.

Rules and Regulations:

If a person from own or other village needs timber for essential purposes he has to apply to the secretary of Karadapal Forest Protection Committee (KFPC) giving the detailed reasons of timber requirements. Application is presented in the next meeting and investigating committee is given-in-charge. The investigating committee investigates actual needs of timber by the person. The application is then approved in the same meeting and by president and secretary. Based on the needs some money is charged towards cutting of timber. There are specific monetary charges for different purposes.

Outsiders can also collect timber for their use from the Karadapal forest with prior information and permission from the committee. They only can cut timber in presence of the investigating team in the forest. Any person disobeying will be subject to severely penalty.

Table 2.3: Monetary charges to be for different timber purposes

Purposes	**Charges to be paid (in Rs)**
Timber felling without permission of the committee	50.00
Timber used /plough /HH	0.25
Fuelwood/HH/yr.	2.00
Timber use for repair of old house	2.00
Timber for construction of new house (per room)	3.00
Fencing (Cutting of shrubs/bamboo)	1.00
Wood required for burning of bricks (per 1000)	5.00
Wood required for burning of roofing tiles (per 1000)	5.00
Collection of fuelwood for burning of earthen pots (per potter/month)	1.00
Construction of new house (wood sheet preparation/room)	10.00

Charges to be paid by the outsiders for timber extraction

Purposes	Penalty (in Rs)
1. Timber harvesting for repairing of older house (per single room)	25.00
2. For ploughs	10.00
3. Timber harvest for plough in absence of committee members	100.00

One of the *outstanding* rule made by the villagers for outsiders *i.e.* villagers of surrounding villages are strictly prevented from timber harvest for new house construction.

All rules are made for timber extraction only and there is no rules pertaining to collection, distribution and selling of NTFPs by the committee.

Investigating committee:

There is no such sub committee under the KFPC known as Investigating Committee. The investigating team consists of all members of the committee. It is formed to keep strict vigil on the rules and regulations of KFPC. The committee investigates the actual timber need of the person and to prevent any malpractice by the person during timber cutting. The Committee also chooses the tree(s) / timber to be harvested from the forest. Following steps are taken during their investigation:

- Investigation can also be done in presence of the ward member and other respectable persons of the village besides the investigating committee, if required.
- The villagers in absence of the investigating committee can also do investigation if there exists any urgency for the investigating committee or absence of the ward members.
- If person in question is found to be guilty who did apply to the committee but found to be malpracticing, he has to be present within 12 hrs of identification. Otherwise the committee (there had been instances where son-in-law of these villagers are also prosecuted and punished) takes necessary steps against him.

Watching system

There had been no such watching system exists for the Revenue Forest by the KFPC because of small patch surrounded by the village hamlets and offenders are easily caught.

Punishment

Penalty charged to the villagers found guilty and there had been no such structured penalty system for the villagers of this village Penalty amounts are quite random and usually are lower than charges for outsiders. If a person is frequently cutting timber and found to be guilty for several times, he is boycotted from their society and this is the highest punishment of towards the person.

Changes in rules & regulation.

There had been no changes in the rules and regulations of the committee and the older rules and regulations still exist.

REGIONAL FOREST PROTECTION COMMITTEE (RFPC)

Being the problems same in the other villages, showing parallel devastating effect in their own village forests, other villagers were inspired by the villagers of Karadapal, and formed their respective village forest protection committees But major forest resource was the *Atei* Reserve

Forest. It is a good source of livelihood to all surrounding villages. It is subjected to frequent timber felling by their own villagers and outsiders such as from Ghatgaon (12 kms North), Ghasipura (20 kms NE) and Anandpur (35 kms NE). Single village can hardly manage such a huge Reserve Forest and hence, there was a subsequent suggestion to protect the *Atei* Reserve Forest by a combined action to take the responsibilities of *Atei* Reserve Forest. Hence forest protection was initiated by formation of a Regional Forest Protection Committee (RFPC).

Regional Forest Protection Committee (RFPC)

Anchalika Vana Surakhya Committee (Regional Forest Protection Committee) is an unregistered body first to be in Keonjhar district originated on 25th March,1992 at Chandpashi Chhak (Chandpashi square,Village Chandpashi). Villagers of three GPs namely Shagadpata, Bhagamunda and Dhoradiamba attended the meeting. Villages are Billa, Hatikucha, Nuagaon, Maniabindha, Kheliamunda, Sirispal, Badakhamana, Karadapal, Jampashi, Dhoradiamba and Jamuda attended the meeting. A regional committee was established, working committee members were elected and office was set up at Badakhamana keeping following objectives in forefront:

Objectives:

- All village protection committee were to protect the degraded forest of their own villages. Some village committees decided to plant good quality fruit yielding trees in their respective protected forests.
- Each village forest protection committee has to cooperate with the RFPC.
- Encroachments are to be strictly prevented which was gradually converted to agricultural land and wood smugglers and woodcutters are to be handled in tougher hand.
- Forests are to be investigated properly to protect from fire and strong public awareness towards forest fire prevention is to be carried out.
- Meetings were to be held in each 3 months period for discussions for normal situation and emergency meetings are to be held when required. Working committee was given in-charge to hold the emergency meetings.

Other villges such as Hatikucha has also initiated the process but failed due to non-participation of villagers.

Shape and size of wood cutters:

All woodcutters are male and menace the forest atleast number raising from 30 to 150 with axes and pairs of bullocks. They use bullocks to drag the log to their destination. One person usually enters with one pair of bullocks but single person taking upto three pairs of bullocks are also of no exception. They cut timber during night and drag it to the villages during early morning to avoid from people.

Frequency of timber felling

Outsiders cutting timber enter the forest randomly. If conditions are sound for them, the frequency may be upto three to five days per week. During mass watching, frequency reduces to once a month or becomes rare.

Committee Members: -

Usually the members of RFPC are the elderly members of respective participating Village Forest Protection Committees (Members of initial phase of RFPC could not be accessed)

The responsibilities of Regional Forest Protection Committee were handed over to other group of members of three participating Gram Panchayats on 25th May 1995.

Villages	Members

Chandpashi	Bidyadhar Mahanta
	Guria Munda
	Pundan Hembrum
Hatikucha	Gangadhar Maharana
	Jaysingh Munda
Maniabindha	Baishnav Patra
Karadapal	Sidio Munda
	Dasharath Munda
	Navru Mahakud
	Sanatan Hansdha
	Rajballav Nayak
Badakhamana	Bhimsen Majhi
	Chandramohan Majhi
Kheliamunda	Asharam Mahanta
	Sadananda Hansdaha
	Lasa Majhi
	Ravindra Mahanta
Sirishpal	Dukhabandhu Majhi
	Manamohan Majhi
	Chintamani Majhi
Jampashi	Ghanshyam Munda

President	:	Rajballav Nayak,
Vice President	:	Gangadhar Maharana
Gen. Secy.	:	Chandramohan Majhi
Asst-Secy	:	Sanatan Hasda
Treasurer	:	Dasharathi Munda.

During the year 1996, Charges were redistributed and following changes are made.

President	:	Sushil Chandra Sahanya
Vice-President	:	Gangadhar Maharana
G. Secretary	:	Maheswar Munda

Presently, it is a 32 membered body are out of there are 2 women, 1 S.C., 5 Milkmen, 1 is Blacksmith and
23 are tribals.

On 8th October, 1995 RFPC taken decision to add villages Tikira, Jhinkapita, Jambahali, Baithajala, Kumitangiri to increase mass of protecting villagers and prevent increased timber feeling.

Forest department approached the villagers to form Vana Surakhya Samiti (VSS) under JFM principles but the villagers did not agree to it.

Operation of the Committee

Conduct of meeting

As per the scheduled resolution the meeting should be held at each 3 months. Although there had been a time schedule for the meeting, emergency meeting raised from conflicts are immediately attended and decisions are taken. Initially hand written notification - mentioning date, venue, agenda of the meeting is given to all committee members. Committee also asks to bring -

out their main problems related to forests for resolution. Each member has to pay only Rs.0.25 as a meeting fee per meeting. This fee is deposited in the committee treasury. First of all the conflicts raised during this period is solved (please refer conflict resolution section) and punishment is prescribed (also refer punishment section). There exists two types of meetings firstly, executive body meeting and general body meeting. So far the total number members attending general committee had reached upto 132. All members attending the meeting sign their attendance register. During emergency meetings at least five persons from a single village must attend the meeting.

During the meeting, any person in need of timber, has to apply through a written application to the General Secretary of RFPC seeking permission to cut required timber. It is being investigated by committee members and monetary charges are imposed as per the committee's regulations (*e.g* person requiring wood for three small rooms is charged @ Rs. 20.00/room).

Future programmes are also discussed in the meeting.

Punishment system

To keep their forest intact and to improve it, they have formulated strong and forceful modes of punishment
If a person is found to be guilty and cut red handed cutting the trees from the protected forests, he is subjected to following punishments depending on his situation.

- Name of the woodcutter, his father's name, name of the village is noted. Colour, number of bullock pairs, name of the bullock owner, his father's name, village name is also written on a blank white sheet.

- Bullocks are also seized. Woodcutters are charged with strong penalty depending on type of wood they have felled. The charges often reaches upto Rs 1,000.00 per person. If fine is not paid immediately, they have to loose their bullock pairs untill they have paid the charged fines. On payment of the penalty, the bullock pairs are released but logs, saws, axes are never returned back.

- The villagers also take written agreement from those woodcutters promising not to enter their *Atei* Reserve Forest again. If they enter they are forced to obey the rules and regulation of RFPC under the campaign in Odiya (oriya) *Jangala Surakhya Aamara Rakhya* (We will be saved if forests are saved). He also promises to keep up brotherhood with these villagers and to make this agreement public.

- If one of the villagers a part of protecting villages does the same mistake and brought under captivity he is charged with half amount with respect to outsiders not involved in protection.

- When the persons held responsible for cutting timber are held but devoid of any bullock pairs, he is not released unless he has not paid the required fine. RFPC takes the responsibility for their feeding charges.

- If a person is unable to pay the required amount captivity but able to pay it later, he is released after being written and signed an agreement letter clearly signed or clear thumb impression on it.

- If the protection force (watching group) is able to capture few people and others are escaped, then RFPC charges the total fine from the captured people. If he is /they are unable to pay immediately a written, signed agreement of kept preserved and utilised for punishment during another point of time if he doesn't /they do not pay as per agreement.

- RFPC also informs to the forester of Harichandanpur Block regarding the incidents and their decisions as this operation is being carried out in the Reserve Forest.

- Their punishment system is never biased. It is strong enough to punish one's son-in-law due to cutting of 4 sal trees without prior permission of the committee. The committee members

caught him when he was trying to hide. This was further investigated by his father-in-law and after getting him guilty, he handed over his son-in-law to the committee for punishment. As a punishment he had to leave his father – in – law's house immediately with necessary fine was to be paid.

- Irrespective of any persons such as village committee member if found to be guilty are not free of this punishment.

Conflict Resolution

Strong penalty systems lead to origin of conflicts within and surrounding villages. They also have conflict resolution mechanisms. They have different mechanisms for different situations.

1. Penalised persons take revenge when get chance by snatching belongings such as cycles, new clothes vegetable, etc. forcibly when the forest protecting villagers visit their relative's house, if the latter's relative's house is in former's village. RFPC intially was compensating the loss of the villagers by purchasing the loss such as new cycle of same size & colour and payment of money towards the loss of other belongings. But due to increased rate of allegations it seemed impossible to compensate for all and hence cases were handed over to the police.
2. If cycle is under the owner's possession but damaged, the person is provided with repairing charges by the Regional Forest Protection Committee.
3. A scheduled date is fixed for conflict resolution by the RFPC in between the victims and the culprits but often absence of the culprits in the meetings were frequent and hence the cases remained unsolved. The culprits have been noticed cutting timber thereafter and revenge is taken at the spot by arresting and charging him with heavy penalty.

Although FD members interact with the RFPC members but no FD staff respond to RFPC's decision.

Watching responsibilities:

Besides keeping its aims and objectives on track *i.e.* prime responsibility to protect forest through mass action, it ensures night watching of the forest by a group of people from the protecting villages. If the president or other executive committee members get any symptom of jungle cutting by outsiders, groups of people of protecting villages are informed to assemble at a common point inside the *Atei* Reserve Forest. Members from all protecting villages of RFPC join to increase their strength. Usually they assemble during evening with their bow and arrows, torchlights and lanterns. However, their forest watching is random. Unlike Gadabanikilo, forest is not watched daily. Whenever there is any sign of forest cutting, on that day president of RFPC, immediately informs the participating villages about night watching of forests. After being assembled, keeping brief information about the size (within forest) of timber felling, they trace out footprints of human, cattle and cattle dung etc and proceed gently. They never flush at once rather wait until the woodcutter starts cutting trees with axe. Then flushing begins. Watchers never go isolated from different directions rather as a group to the same focal point. They immediately capture the woodcutters and seize their axes and all pairs of bullocks. Often, they threaten the woodcutters with their bows and arrows if woodcutters dare to escape. Even in some instances, some people escape and the penalty is charged from the captured persons. After being captured, they submit these persons in front of the committee members and maintain a register in which they mention date of investigation, number of culprits, axes and log size etc. systematically. In turn, no remuneration is paid to the night watchers.

Village Suruguda

FOREST PROTECTION AND MANAGEMENT SYSTEM:

Initiation

The protection campaign began in the year 1985 initiated by the members of the Harijan community and gradually the entire village (including Bhugrapada) participated. Though the

Bhugrapada broke away after some time, another hamlet i.e. Milu Pada belonging to a different revenue village, was included in the forest protection group.

Trigger factor:

The protection effort initially started as a retaliatory step by the Harijan community of Suruguda. Harijans from Suruguda were denied rice at the ration shop at Jhariapalli bazar. After this, in a meeting attended by members from Gauda pada, Brahmin pada and Dhanwar pada of Suruguda, it was decided not to allow the people of Jhariapalli to take produce from the nearby forest. It is important to note here that the people of Jhariapalli village depended on this forest patch for firewood and for fencing material for their vegetable fields.

In the initial stage leadership came from harijans from the harijan pada. The protection team approached Dukalu Pruseth (Ward Member) of Bhuiyan pada for guidance and appointed him as the president of the Forest Protection Committee. Gangadhar Patel, the then Sarpanch was also invited into the group and his help was also solicited. An application was sent to the DFO seeking his approval to protect the Reserve Forest patch. Soon after, the DFO gave his consent verbally and interest in the protection process was increased.

A few months later, the entire village decided to join in. A village meeting was called to discuss on collective protection. One member from each household (only male) was present in the meeting. At this meeting a seven-member committee was formed under the presidentship of Dukalu Pruseth and Secretary Purna Panda. Representation from all the hamlets was ensured in the committee. Since the Harijans and Bhuiyans were pioneers in the protection process hence two members were invited from each of these communities.

Though the incident with Jhariapalli was the immediate trigger for forest protection, there were other long-standing concerns that influenced the decision to protect forests as well, these were:

- Acute scarcity of fuelwood.
- Lack of availability of wood for other purposes like house construction, agricultural implements etc.

In the initial periods of protection people faced a lot of problem, as there was no ready alternate source of firewood. During that period the villagers were mostly dependent on leaves and Bhusee chullah (a locally developed stove wherein paddy husk is used as a fuel). For a few years they depended on the Amari branches from the riverbeds for cooking fuel. A few families developed "Gobar gas" system under D.R.D.A. project but could not sustain because they did not have requirement number of cattle.

The Forest Department supported the forest protection effort by villagers by forming a Village Forest Protection Committee in the village as per the Government resolution of 1988in this regard. After the JFM resolution of 1993, the Forest Department formed a Vana Samrakhan Samiti (VSS) in 1994 and entered into a Joint Forest Management arrangement with the village.

Dynamic evolution of Forest Management Group

Initial initiative for forest protection came from the Harijan pada. After a few months, however the entire village got involved. Within a brief period of three months after protection started there was an intrusion by two Agharia people who were caught red handed while cutting poles from the protected patch. The offenders were penalised. After this incident the entire village decided to join the protection effort

It is interesting to note that after this incident the Agarhias realised that they were being excluded from a potentially significant activity, and that their decision to join in was influenced by the need to "regain" control over an important resource.

Involvement of Bhugrapada in Forest Management Group:

Bhugrapada, which consist of four hamlets, forms a major portion of Suruguda in terms of household and population. But it does not have any major link with the rest of the village

other than the legal status. In the initial stage, the entire revenue village including Bhugrapada came together but after short period of time Bhugrapada broke away. Following factors may be attributed to this:

- Bhugrapada is far off from the protected patch, which hindered the mobility of people, and hence they got disinterested.
- Most of the households (nearly 163 out of 225) are landless and depends on daily wage labour. Foregoing a day's work for patrolling spells a loss of earning for the day, which is critical loss.
- The Bhugrapada people could easily meet their needs from nearby forest patches to which they have unrestricted access.
- Most of the household belong to the so-called lower caste and have little influence or say in the village affairs. This has also proved to be a major obstacle in getting along with the rest of the village.

Inclusion of Milupada:

Milupada does not come under the legal jurisdiction of Suruguda rather it is a hamlet of the adjoining Kolebira village. The significant thing about Milupada is its location (Refer to the resource map) which is highly strategic by virtue of its close proximity to the forest. It is a tribal hamlet and their degree of dependence on forest is much more. Their association is based on the following reasons:

- It was realised that inclusion of Milupada would enhance the effectiveness of the management system. Milupada's inclusion has actually enhanced the effectiveness of forest protection.
- Milupada decided to join in since that gave Milupada access to common resources of Suruguda particularly the grazing land, since the grazing land is within the boundary of Suruguda. Thus the whole affair was a matter of reciprocity.

Structure of Forest Protection and Management Committee

The first committee comprised of 7 executive body members and 120 general body members. Presently the number of members of Executive Committee has increased to 17. For a fair representation the executive body, members from all the hamlets are included though their number varies for different reasons. People of the respective hamlets select their representatives for the executive body. The important office bearers in the committee are the President and Secretary.

The General body through selection process appoints executive body members. For the first time during VSS formation in 1994 voting was done for the post of President and Secretary. The first committee led by Shri Dukalu Prushet continued for quite a long period -for almost 11 years excluding a few who resigned after two years on personal grounds. After the breakdown of this committee frequent changes in the subsequent committees were observed. A major reason of these changes is absence of strong leadership and vested interest of some individuals within the village.

Frequency of Meetings

The period of meetings is not strictly fixed. In the initial period meetings of the Executive body took place once in a week. Gradually the frequency of meetings decreased to once in a month. Whenever required and or whenever an offender is caught meetings are called immediately. The meetings focussed on protection system and offences. The committee appoints a person from the village itself for intimating notice / information to the committee members and the villagers. The person who gives the message is called *Katuala*.

Meetings of the FPC are generally held during night in the meeting hall of the committee. Depending upon the situation and urgency meeting is even held during the daytime. While the executive body meeting is restricted only to the members, in the general body meeting any individual from the village irrespective of membership can participate. But it is compulsory that at least one person from every household should attend the general body meeting. Usually male individuals attend the meetings. Even after the appointment of women members in the E.C and one female from every household representing in the general body, they hardly come to the meetings. During very few occasions only when there is a meeting called by the FD or if there are

any visitors from outside their presence is seen in the meeting. This kind of involvement can at best be viewed as superficial participation.

Table 2.4: Representation of Members from different hamlets in the FPC

Hamlet	Members	Sex	Caste	Designation
Bhuinya Pada	Alekh Bhoi	*Male*	**ST**	Member
	Khadi Kalo	Male	Bhuiyan	Member
	Pabitra Patel	Male	**Agharia**	**President**
	Sadashiv Patel Saroji	Male	Agharia	Vice- President
	Charulata Patel	Female	Agharia	Member
	(Sarpanch)	Female	Agharia	Member
Brahman Pada	Laxman Kisan	Male	ST	Member
Harijan Pada	Gojendra Badi	Male	Harijan	Member
	Gulapi Sa	Female	Harijan	Member
	Sesadev Suniani	Male	Harijan	Member
	Sukru Buda	Male	Harijan	Member
	(Ward Member)			
Agharia Pada	Bipin Buda	Male	Harijan	Member
	Tikina Chowdhury	Male	Agharia	Member
	Motiram Chowdhury	Male	Agharia	Member
	(Ward Member)			
	Somendra Patel	Male	**Agharia**	**Secretary**
MiluPada	Kumar Majhi	Male	ST	Member
	Saraswati Kisan	Female	ST	Member

Rules relating to Forest Protection/ Patrolling

Protection started with 'complete restriction on entering the forest'. No individual was allowed to go to the forest. Initially, six persons used to go for patrolling each day. Later on the number of pallias (volunteers for patrolling) were reduced to four. Now, two persons go for patrolling duty each day. Patrolling duties are on rotation basis and on a household basis (i.e. one person from the household whose turn comes).

The system of patrolling is termed as "thengapalli", thenga refers to the wooden stick/ baton that passes from household to household signifying the "turn" of that household. The patrolling responsibility thus shifts from household to household on a rotational basis. Night patrolling was also done initially for a period of two years. Gradually when the external threat reduced this was stopped. For the initial period of three months there was no forest protection committee. The president used to coordinate the entire process. In case any problem arose it was solved with mutual understanding. Recently when the study was carried out voluntary patrolling discontinued.

Rules related to cleaning and thinning operations

The General Body takes decision for annual cleaning and thinning operations. A common meeting of the village is convened where in at least one person from every household is present. The decisions are communicated to the Forester and the local Ranger through the committee members. Under the joint supervision of the Forester, F.G. and the Committee cleaning is undertaken. In practice they do not remain present for the entire day of cleaning. President remains present in the spot during the cleaning period. However this does not apply to all members.

During the silviculture operations only the invaluable species, dry and fallen branches, deceased tree branches and matured bamboo poles are harvested. No one is allowed to cut green trees. This was decided to allow the valuable species to grow. Different patches are being cleaned on rotational basis.

Timeline of the functional dimension of Forest Protection and Management system

1955-60 Forest given in coupe to private contractors

1970-71	Stones for construction of dam in the nearby was collected from this hillock
1979-80	Plantation in Anabadi land adjacent to Bindha RF by Afforestation department (Around 10,000 saplings were planted)
1985	Conflict with Jhariapalli village on control rice resulting to protection initiation
1985	First informal FPC formed
1985	***Informal set of rules framed by the committee***
1986	Milupada hamlet was included in protection
1987	Prakruti Mitra Prize awarded to Suruguda
1988	Conflict with Chhetenpalli and demarcation of boundary of forest area
1988	Forest Protection committee formally got structured by the FD (10 members committee was formed under the leadership of Dukalu Prushet)
1988	***Penalty system strengthened by fixing different rates of fines.***
1988	Application forwarded to DFO, Collector for grant for construction of meeting hall of the committee which was accepted
1989	President and Secretary were re-nominated. This happened with the help of the FD.
1989	Paid watchers appointed for some days since the villagers were busy in harvesting of crops
1989	Vana Mahotsav organised by the committee
1989	*Banabandhu* award received by Suruguda people
1989	***National award 'Indira Priyadarshini Brikshya Mitra Award'***
1989	Visit by Industry Minister and Forest Minister. (This case is over highlighted by FD. Hence,any officer or minster come to these locality pay a visit to the village.)
1990	Inauguration of meeting hall of the forest protection committee
1990	***Fine amounts increased in order to put more pressure on offenders***
1990	Shri Gangadhar Patel, the Sarpanch was appointed as Samiti Chairman
1990	New committee formed. The earlier President and Secretary resigned. New President – Bhupal Patel and Secretary – Pabitra Patel (9/9/90).
1990	Committee was dissolved in the presence of Forester. Reorganisation of the committee with Dukalu Prushet as President and Pabitra Patel as Secretary (10/10/90)
1990	Cleaning operation in 50 acres of reserve forest
1991	Occurrence of forest fire
1992	Formation of new committee under the Presidentship of Dukalu Prushet and Purna Panda as Secretary
1996	Firewood cleaning in reserve patch
1997	Bamboo and firewood cleaning in reserve patch
1997	New committee formed. The new President and Secretary selected were Manbhula Sa and Gangadhar Patel respectively (11/2/97)
1997	Change in committee. President – Sukru Guda and Vice-President – Motiram Chowdhury (17/5/97)
1998	Change in committee. President – Pabitra Patel and Vice President – Sadashiv Patel(15/11/98) 4 female members were included in the committee for the first time
1998	Bamboo harvest in reserve patch
1999	Firewood cleaning in Khesra forest
1999	Bamboo harvest in reserve forest The committee arbitrarily stopped firewood cleaning

EXTERNAL THREATS

External threats over the forest from neighbouring villages Chettenpalli, Badakhalia, Kolabira, Chauran Mahul, Jhariapalli, Benidhipa continued even after the beginning of protection efforts. Gradually, after a few years the pressure declined as the message of protection by Suruguda people spread.

According to the villagers, no serious conflicts/ physical clashes took place with any outsiders over the sharing of benefits from the forest. However, they had a misunderstanding with their neighbouring village Chettenpalli after the protection was started. Protection of a large area by Suruguda people affected the Chettenpalli village which was left with no forest area adjoining their

village for protection. They too started protecting a portion from the same patch. Perceiving threat of future conflicts, Suruguda village took steps for resolving the problem.

According to the then President Shri Dukalu Prushet of Suruguda forest protection committee was aware of the fact that the villagers legally have no rights over reserve forest. So they felt that if they denied a sharing from the resource to Chettenpalli village, and the case goes to the FD, then they might lose the entire area. With this apprehension people of Suruguda contacted the DFO for allocation of areas and he helped the villagers in demarcating the boundaries between the two villages. Chettenpalli village was given 56 acres from the patch being protected by Suruguda and Suruguda retained 200 acres of forest areas. Boundary demarcation was done in the presence of the Range officer, Forester and Forest guard.

At the initial stage the community institution was in the form of an informal committee. During that time there was dominance of the so-called "lower" castes. This also happened, as they had a greater hand in the initiation process.

The changes in the community institution came when it was formalised first as VFPC in 1989 and later as VSS in 1994.

Leadership in the community institution has had an important role to play in its functioning and resilience. The initial President of the forest protection group provided leadership for about 7-8 years. He was popular in the village and enjoyed the trust of majority of the villagers and effectively managed the community institution. People consider his tenure as the most stable period of the forest protection committee. After his stepping down, there have been quick changes in the committee. A possible explanation for this is the attitudinal change. It is visualised by the people that the new generation leaders considers the VSS committee is a source of power and position. They don't show much interest in forest management.

Although the FD intervened way back in 1989 it only in the year 1994 that the committee got a more formal shape with the formation of VSS. Thus there has been a gradual transformation of the institution i.e. from an informal institution to a formal set up. With this change in the structure of the organisation the status and style of functioning of the institution also underwent a change.

GENDER AND EQUITY CONCERNS

Although the VSS is considered to be an important institution by the villagers, its working is confined to the protection process only and it has no role in the other affairs of the village. Though there has been a fair representation of every community in the committee, women do not play a significant role in the actual functioning of the institution.

Women were included in the Forest Protection Committee only after the formation of the VSS, in consonance with the JFM norms, which stipulates a minimum representation of 3 women in the committee. The committee members agreed that women have been included to abide by the JFM norms but the need for women's participation had not been felt by the male leadership.

Women have been included for name-sake only, while they do not play any role in the decision making process of the committee. There have been instances when the women members have been asked to sign documents on matters that were discussed in meetings, on a later date, even though they were not present in the meeting.

The benefit distribution (amongst villagers) used to be equitable, but things have changed of late and there is increasing appropriation of benefits by the elite. In the last cleaning operation, the benefits were grabbed by the few influential people During the group discussion the backward classes opined th[illegible]eir interim needs are not being met and are not getting attention in the forest protection and ma[illegible]gement.

As far as the costs for forest protection is concerned, all the households contribute equally though not equitably. Each household contributes voluntary labour for patrolling irrespective of the family's financial condition and other constraints. In a group discussion it was told that a widow of the

village, who is really poor and is giving money to her nephew to contribute free labour. This indicates there is lack consideration for poor and old aged widow those struggle to lead a just life.

In the other hand the committee has not put any restriction on NTFP gatherers especially KL pluckers from near by villagers have access to the protected forest. Such an egalitarian approach has been taken keeping in view the economic conditions of NTFP gatherers, for whom it is a critical source of livelihood during lean season.

Role of Forest Department

Suruguda has been projected and highlighted as the success story of JFM by the Forest Department. At the initial stage of JFM process, FD had been very supportive. When some Agharia men were caught felling trees in the initial stage of forest protection, the then protecting group (harijan pada) was completely supported by the FD in their decision to penalise the offenders. This definitely strengthened the forest protection process. Gradually the support of FD declined over the period of time. The FD had also failed to play any role in the case of equity issue, cropping up in the village. Rather it had added to the tensions by siding away with the influential group.

Again in 1989 the FD helped them in forming the Village Forest Protection Committee in tune with the JFM Policy resolution brought about in the year 1988.

Presently the Forest Range Officer has a positive image among the villagers, while villages lament insufficient support from the Section Forester.

It is interesting to note that the Forest Department has also helped the agharia consolidate the position of prominence in the Forest Management system.

In this context, the following incident is significant which was revealed during the group discussion.

A person from Harijan community was charged with a fine for cutting some tree, he paid half the penalty amount and promised to give the balance after some time. On getting this news, the forester again fined that person despite the fact that the committee had already resolved the case. Also the committee did not put any objection in this regard. While in several cases, when Agharia are involved the offender is let off relatively easily.

In Suruguda, the FD prepared a micro-plan for management of forests but this was not done in a participatory fashion. This could be judged from the following instance. When we discussed with people we found that most of the villagers were not even aware of such a micro-plan. The activities planned in this micro-plan were not executed. There was no effective involvement of village people for preparation of the micro-plan. The Forest Department is yet to internalise the concept of participatory forest management and effectively involve village community in management of forests.

Village Baghamunda

Forest Protection and Management system:

Initiation

The social forestry scheme was implemented in Baghamunda in the year 1986. As a result of this the VFC was formed in the year 1989-90 to look after the plantation. By this time the natural forests had also and the villagers were facing acute shortage of wood especially for making agriculture implements. Thus the need of protecting the forest was gradually being felt by the people.

By then, local NGO, Sahjog had started to work in the village and formed the Yuvak Sangha in 1991. During the same period Sahajog had also started a campaign on forest protection and organised meetings in villages, which had some impact on the people.

Subsequently the Yuvak Sangha who were also the members of the VFC took up the protection activity in the year 1991. As per the register maintained by the YS the area of protected forest includes 300 ac of natural RF, 80 ac of teak plantation (within RF area) and 25 ac of social forestry plantation. However the villagers have a differing opinion on this. As per their version the total area is around 500 ac.

Change of guard

During initial few years protection was carried out in a loose fashion. The Youth Club simply inform the outsiders coming to the forest that the forest patch was protected and they could no longer take wood from the forest. However, they were not very successful, specially as FD provided no support to the Youth club. A number of conflicts occurred with persons from other villages. Therefore they decided to formalise the protection efforts in the year 1993 undertaking following measures:

Regular patrolling of the protected forest patch by two voluntary watchers per day
Separate forest protection subcommittee (within the YC) formed comprising of few members

However, after patrolling was started by the YC, the intensity of conflicts increased. The small village community was unable to sustain these conflicts with the neighbouring villages and the forest protection was stopped after six months after the formalisation. The basic reason underlying this event may be summarised as under:

- There had been frequent conflicts with the adjoining offending villages, which sometimes used to assume serious degree. The men offenders used to react aggressively to the patrolling party, sometime leading to physical clashes. The people of Baghamunda were threatened of dire consequences by people from the nearby villages. The situation deteriorated to such extent that even the shops of Kandhal village had stopped selling goods to the people of Baghamunda. Gradually conflicts had become routine affair disturbing the peace of the village. As a result the YS decided to give up the protection effort.

The forests in the adjoining areas were already in a degraded condition owing to pressure of the surrounding villages. The neighbouring villagers were also facing scarcity of forest products and depended on the forest patch near Baghamunda for some of their requirements, specially for small timber and fuelwood.

- It also seems that there were internal problems within the YC with some of the members not attending the patrolling duty seriously. The villagers say that the FD also didn't support the YC and Baghamunda village in their effort and didn't take action on the cases referred by the villagers to it. This demotivated the YC members further.

The forests remain unguarded for the next six-month. Thereafter the Mahila Samiti with the encouragement of Sri Shankar Sahoo took over the protection work at the end of 1993. Shri Shankar Sahoo of VFC played a pioneering role in mobilising the women to come forward and take up the work However, with the onset of agricultural season the group failed to give the same amount of time and attention to the process. This again led to rampant felling from their forest area.

This led to a rethink on the issue in the village community and the women group. There was a growing realisation that their rich resource might get lost completely if not protected. The women also say that they felt that their husbands effort to protect the resource would have go futile The village leaders again encouraged the women group to reinitiate the protection effort. With this the group once again took to forest protection.

The villagers are of the opinion that women could protect and manage the forest effectively as the offenders would not dare to react to the women in a negative fashion. Besides this general opinion, women put forward some specific reasons, for taking up forest protection:

- There had been an acute shortage of firewood. As a result they had to go to far off places to collect wood.
- Lack of Sal seeds which are collected by the women and exchanged for salt with traders
- They couldn't get any shade from the scorching sun during the collection of Kendu leaves.

An old woman said "*after the forest grows up we can have wood for building our house. Though we cannot afford to have a big building but atleast we can have a comfortable shelter to live in. I have four sons (with families) sharing one common house. Because of scarcity of timber after the degradation we are forced to live in smaller rooms.*"

For better functioning, the Mahila Samiti has appointed a separate President and Secretary to look after the forest affairs. However, the forest protection committee is an integral part of the Mahila Samiti only. Significantly, the meetings of the Mahila Samiti on forest issues are also attended by Shri Shankar Sahoo who guides these meetings. The Mahila Samiti also defers to him on the major decisions regarding the forests. Effectively, the Mahila Samiti works under the benevolent guidance of Shankar Sahoo, who is the main leader of village.

Rules and regulations

For effective management and protection of forest the village has framed certain rules and regulations over the period, which may be summarised as under:

- No body shall sell any wood from the forest.
- No body shall indiscriminately fell the trees.
- If firewood is required, cleaning would be done and the wood is to be divided equally.
- Wood required in bulk quantity for domestic purposes can be brought after getting permission from the committee
- Collection of everyday requirement of the firewood is free
- During the period of Yuvak Sangha there were two member-patrolling parties and women do not use to go for the same. When MS took up the protection work this number was increased to five, which was exclusively women group.
- In case of unavoidable situation atleast two persons should go for the patrolling work.
- Those who skip the patrolling work shall be penalised.
- Outsiders are not allowed to take fuelwood from the forest. However there is relaxation if they are taking only dry twigs.
- Although cattle's grazing is allowed, goats are not allowed inside the forest.
- No body is allowed to carry an axe without permission in the forest
- For the first few days no outsider is allowed in the protected patches to collect Kendu leaves
- Putting fire in Kendu bushes to have good quality leaves is completely banned.

The above rules are written down and have been framed by the Mahila Samiti with help and guidance of Mr. Shankar Sahu. Apparently the rules may look rigid but in practice some of the rules, specially related to the Offence cases they are applied flexibly.

Watch and Ward

A five member (all women) team carries out the patrolling of the forest. In all there are five such teams who do the work on rotational basis. In case of unavoidable circumstances, there is a provision that atleast two members of the team can go for patrolling. This is however decided as per mutual understanding within the group members. In case a female member fails to turn up for patrolling work, a male from that family contributes.

Though presently menfolk are not directly involved in the protection effort, they always lend their support at times of necessity particularly when there is a big offence or night patrolling is required to nab the offenders. There had been instances when the men and women have jointly guarded the forest for two long nights at a length in order to identify the offenders

Penalty

Generally in most of the cases the offenders are warned and effort is made to convince them until and unless the offence is of serious nature.

Barring the petty cases, others used to be referred to the forester, who would fine the offenders. However the amount of fine was never shared with the committee. The villagers also complain that may times, if the offender was an important person or could gratify the forester, he was left free. Hence slowly the villagers have started to resolve the conflict on their own and keep the fine money with them. In cases of matters, which are being settled by the village itself, they follow the policy of harassing the offender by delaying the judgement. This process, according to them, is the most effective way of teaching the offenders a lesson.

Rates of Penalty

The rates of penalty has been fixed by the village (Mahila Samiti and Mr. Shankar Sahu) and as follows:

Sal trees - Rs 25 per feet
Asan trees - Half the fine amount of Sal trees
Other species - do not have any fixed amount. Fine is decided based on the species type and size of the tree.

Meetings

Earlier a *dakua*(messenger) from the village itself was selected to intimate about the meetings date to the members. This process has been abandoned since last two years. Now the people use different instrument for calling meetings. For women's meeting a *ghanta* (metal plate used in puja) is beaten and in case of men's meeting counch is used. The village being small and compact, the attendance in the meetings is good.

Benefits from the regenerating forest:

The regenerating forest is dense forest with good undergrowth. The Sal trees have attained pole size while the Mahula and Char have not yet matured enough to give any yield. The forest undergrowth is capable of providing medicinal plants to the local Vaidya's. The regenerated forest, according to women is providing them a resting-place after few hours' work in the scorching sun during the Kendu leaf-plucking season. The regeneration has also led to reduction of soil erosion and improvement in water regime in the agriculture land in the lower catchment areas.

Cleaning and thinning operation

The village as such does not have any periodic system of cleaning and thinning operations in the forest. The villagers have also not developed any formal mechanism of sharing forest produces obtained from the forest. Since protection began cleaning activities in the protected patch has been carried out four times. Such decisions were influenced by the villager's demand for firewood in bulk quantity and or whenever it was difficult for the patrolling group to move around in uncleaned patches. Usually men do the thinning and pruning work. However, women also assist them during such activities and they chiefly clean the forest ground. Cleaned branches, poles and twigs are left in the forest for drying which is later on carried by the women on their patrolling duty. The women while on patrol also collect dry wood and twigs lying in the forest for fuelwood. As the forest is quite large and the village is small, this method meets their fuelwood requirement, along with collection of fuel from own land and non-forest areas.

NTFP production

The status of NTFP has undergone changes over the years. Presently the villagers basically sell Mahua and Kendu leaf. Kendu leaf is found in the forest area as well as non-forest areas. The mature Mahua trees are mostly outside the forest area in private lands and revenue lands. *Kutchias* (small local traders) come from nearby Kandhal to purchase Mahua. The villagers sell Mahua for cash and in exchange of salt. The Phadi (collection centre) house for Kendu leaf run by the KL Wing of the forest Department is in the village itself. These two forest products, collected mainly by women, form the major part of income from NTFPs (please refer Annexure 6A& B) and form a substantial part of the income of the villagers.

As regards other NTFPs, the villagers occasionally sell different kind of tubers collected from the forest in the local *Hats*. Despite of the presence of large sal forest, villagers are not involved in sal leaf making and selling. Sahajog, the local NGO, tried to set up micro-enterprise on Sal leaf plate making which failed due to want of market. There is good production of mushrooms in the forest during the rains. However, it is used mainly for self consumption due to lack of local market. Though there is a good market for mushroom in Deogarh town but its long distance from the village is a problem. Mushroom, which is perishable produce, needs to be sold immediately.

When the forest was in good condition there was good inflow of Mahua, Kendu fruit & Char from the forest areas which was collected and sold. However, the flow of these products from the forests had completely stopped due to degradation. Even now the regenerating trees are too immature to yield fruits. However, these trees would start fruiting after a few years and would provide additional income to the villagers. Also the flow of Aonla, Harida and Baheda have considerably reduced and the Vaidya has to purchase most of it from outside.

Thus as of now, the protected forest patch does not provide much income from sale of forest products. The main NTFPs which are major income source i.e. Kendu leaf and Mahua are collected mostly from outside the forest area. However, food from forest in form of tubers, some fruits, leaves, bamboo shoots, mushrooms etc. are very important during the lean seasons i.e. late summer and the rains. It is also expected that in a few years, as the trees in the forest mature, the income from sale of NTFPs like mahua, char etc. would increase.

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Box 1

Yuvak Sangha Register

1991	Yuvak Sangha formed. Decision to protect forest
1/4/94	Decision to do pisiculture in the Kanta
5/7/94	Offender caught for cutting 8 teak trees- handed over to the Forester
8/8/94	A separate Forest protection sub committee formed of 5 members from the YS
10/10/94	Cartload of wood with offender caught- handed over to the Forester
11/10/94	Cleaning taken up
13/10/94	Patrolling party increased to three
3/1/95	Joint meeting of the Yuvak Sangh and Mahila Samiti
25/5/96	Offender caught by women patrol group
28/8/97	Supply of fencing material for Foresters house

(The register ends in 1997. However, following can be inferred from the entries)
i) The Forest protection by the YS in the initial three years was loose and more of declaration of intention
ii) The YS tried to strengthen the FP in 1993 through patrolling. Intensified protection led to major conflicts with other villages
iii) The YS could not handle the conflicts and the protection broke down only to be reinitiated through the Mahila Samiti.
iv) The entries from 95-96 show that the responsibility of forest protection had been passed on to the Mahila Samiti

Change of guard

During initial few years protection was carried out in a loose fashion. The Youth Club simply inform the outsiders coming to the forest that the forest patch was protected and they could no longer take wood from the forest. However, they were not very successful, specially as FD provided no support to the Youth club. A number of conflicts occurred with persons from other villages. Therefore they decided to formalise the protection efforts in the year 1993 undertaking following measures:

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depended on the forest patch near Baghamunda for some of their requirements, specially for small timber and fuelwood.

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This led to a rethink on the issue in the village community and the women group. There was a growing realisation that their rich resource might get lost completely if not protected. The women also say that they felt that their husbands effort to protect the resource would have go futile. The village leaders again encouraged the women group to reinitiate the protection effort. With this the group once again took to forest protection.

The villagers are of the opinion that women could protect and manage the forest effectively as the offenders would not dare to react to the women in a negative fashion. Besides this general opinion, women put forward some specific reasons, for taking up forest protection:

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Box No. 2

Flexible application of rules

While patrolling the women apprehended a couple who had come to the forest to collect leaves for goats and were carrying axes which is against the rules. The husband fled after an altercation. However, the women seized the axe from the wife. The axe as brought to the village and Mr. Shankar Sahu was informed of the same. He advised the women to delay the return of the axe to the offender and make them run for few times as they had questioned the authority of the women. Accordingly when the woman whose axe was seized, came to retrieve it, she was asked to come later. This was repeated for a few time and then the axe was returned.

However, on the same day another group was found inside the forest collecting dry fuelwood. They were warned by the patrolling team and asked to leave the forest.

Thus the women apply the rules flexibly depending on the seriousness of the offence and the attitude of the offender. This case also illustrates their dependence on Shankar Sahu for guidance in such matters.

Watch and Ward

A five member (all women) team carries out the patrolling of the forest. In all there are five such teams who do the work on rotational basis. In case of unavoidable circumstances, there is a provision that atleast two members of the team can go for patrolling. This is however decided as per mutual understanding within the group members. In case a female member fails to turn up for patrolling work, a male from that family contributes.

Though presently menfolk are not directly involved in the protection effort, they always lend their support at times of necessity particularly when there is a big offence or night patrolling is required to nab the offenders. There had been instances when the men and women have jointly guarded the forest for two long nights at a length in order to identify the offenders.

Penalty

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The rates of penalty has been fixed by the village (Mahila Samiti and Mr. Shankar Sahu) and as follows

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Earlier a *dakua*(messenger) from the village itself was selected to intimate about the meetings date to the members. This process has been abandoned since last two years. Now the people use different instrument for calling meetings. For women's meeting a *ghanta* (metal plate used in puja) is beaten and in case of men's meeting counch is used. The village being small and compact, the attendance in the meetings is good.

Benefits from the regenerating forest:

The regenerating forest is dense forest with good undergrowth. The Sal trees have attained pole size while the Mahula and Char have not yet matured enough to give any yield. The forest undergrowth is capable of providing medicinal plants to the local Vaidya's. The regenerated forest, according to women is providing them a resting-place after few hours' work in the scorching sun during the Kendu leaf-plucking season. The regeneration has also led to reduction of soil erosion and improvement in water regime in the agriculture land in the lower catchment areas.

Cleaning and thinning operation
The village as such does not have any periodic system of cleaning and thinning operations in the forest. The villagers have also not developed any formal mechanism of sharing forest produces obtained from the forest. Since protection began cleaning activities in the protected patch has been carried out four times. Such decisions were influenced by the villager's demand for firewood in bulk quantity and or whenever it was difficult for the patrolling group to move around in uncleaned patches. Usually men do the thinning and pruning work. However, women also assist them during such activities and they chiefly clean the forest ground. Cleaned branches, poles and twigs are left in the forest for drying which is later on carried by the women on their patrolling duty.

As Biranchi Sahu of the village quotes, ' *there is so much wood lying in the forest, which could if gathered in a proper manner, could sustain the village population for a certain period of time*'. The women while on patrol also collect dry wood and twigs lying in the forest for fuelwood. As the forest is quite large and the village is small, this method meets their fuelwood requirement, along with collection of fuel from own land and non-forest areas.

NTFP production

The status of NTFP has undergone changes over the years. Presently the villagers basically sell Mahua and Kendu leaf. Kendu leaf is found in the forest area as well as non-forest areas. The mature Mahua trees are mostly outside the forest area in private lands and revenue lands. *Kutchias* (small local traders) come from nearby Kandhal to purchase Mahua. The villagers sell Mahua for cash and in exchange of salt. The Phadi (collection centre) house for Kendu leaf run by the KL Wing of the forest Department is in the village itself. These two forest products, collected mainly by women, form the major part of income from NTFPs (please refer Annexure 6A& B) and form a substantial part of the income of the villagers.

As regards other NTFPs, the villagers occasionally sell different kind of tubers collected from the forest in the local *Hats*. De[illegible]e of the presence of large sal forest, villagers are not involved in sal leaf making and selling. [illegible]hajog, the local NGO, tried to set up micro-enterprise on Sal leaf plate making which failed [illegible]e to want of market. There is good production of mushrooms in the forest during the rains. However, it is used mainly for self consumption due to lack of local market. Though there is a good market for mushroom in Deogarh town but its long distance

from the village is a problem. Mushroom, which is perishable produce, needs to be sold immediately.

When the forest was in good condition there was good inflow of Mahua, Kendu fruit & Char from the forest areas which was collected and sold. However, the flow of these products from the forests had completely stopped due to degradation. Even now the regenerating trees are too immature to yield fruits. However, these trees would start fruiting after a few years and would provide additional income to the villagers. Also the flow of Aonla, Harida and Baheda have considerably reduced and the Vaidya has to purchase most of it from outside.

Thus as of now, the protected forest patch does not provide much income from sale of forest products. The main NTFPs which are major income source i.e. Kendu leaf and Mahua are collected mostly from outside the forest area. However, food from forest in form of tubers, some fruits, leaves, bamboo shoots, mushrooms etc. are very important during the lean seasons i.e. late summer and the rains. It is also expected that in a few years, as the trees in the forest mature, the income from sale of NTFPs like mahua, char etc. would increase.

Village : Talbahali

History of forest protection:

The history of forest protection in Talbahali village does not provide a bright picture of forest protection initiation. There was no such triggering factor to initiate the process of protection spontaneously. The initiation was done by one man leadership within this village. Shri Aswini Kumar Mahanta during year 1994 has enabled this village for the formation of forest protection committee with the help of Forest Department.

One of the reasons regarding absence of spontaneous forest protection initiation was due to the fact that the forest patch protected by Talbahali was not subjected to logging permit to any local contractor by the State Forest Department.

However, the forest before protection was noticed to be loosing its initial vigour over time due to several factors, that can be summarised by the following.:

1. *Increased population and migration of outsiders to the village:-*

   Uptill thirties of twentieth century Talbahali village was completely homogeneous being inhabited by ancient Bhuyan tribes. During 1936-37 Mohanta family and other higher caste family migrated from Chakradharpur, Dhurkundi area of Bihar and inhabited this village after the King's permission. The then king of Chakradharpur and Dhurkundi had requested the Bonai king for their resettlement. During early forties. Other lower social castes had also migrated from other surrounding areas and setteled here. Since the Bhuyan tribes are simple hearted and calm in nature, they did not oppose anybody and the area for settlement was "abundant" and hence did not raise any conflict between these communities. During 1976-1980, christians (tribes) have been migrated from Ranchi and started establishing there. Gradual migration of other communities over period of few decades had led sufficient pressure on the existing forest for food, fodder and firewood. Moreover, the outsiders had not registered land of their own and hence, started cleaning forest areas for settlement.

2. *Podu cultivation - Slash & fire technique:-*

   Native Bhuyan tribes have reserved their rights of podu cultivation through slash and fire technique since time immemorial. During King's period, king had given a special privilege to continue this sort of farming as they virtually had no registered land and kept the tribal livelihood secure. Due to increase in population of these tribes, the extent of slash and fire technique was increased manifold. This led to further decline in forest cover.

3. *Grazing pressure:-*

Since, population and diversity of the village increased over years also the different degrees of human pressure on the forest. Their increase in cattle population has also augmented the grazing pressure on the forest. As per the visual estimate, the young individuals of each species stand low (it needs to be linked with vegetation analysis) than the adult members.

4. *Anthropogenic pressure from surrounding villaes for timber and fire wood:-*

As it can be seen from the resource map, surrounding villages such as Bijaghat, Arjunajhari, Baraguda (Bahraguda), Kardakudar, Deogharia & Budhabhuin are not farther from 2 Kms from the forest. The forest patch is the nearest forest patch to meet the forest based needs of these surrounding villages. Gradual expansion of population pressure on it also led pressure to significantly.

5. *Forest fire:-*

Visual observation reveals a mixture of vegetation structure in this forest. There are greater number of Mahula trees in the DPF than Khesra forest. During Mahula collection, it becomes easier to put fire to clear off the forest ground so as to ease the clearing other shrubs. On the otherhand, in the long run, the decline of forest vigour is less known to the villagers of Talbahali and surrounding villages.

6. *Timber for house construction (preferential overexploitation by higher caste):-*

One can see the house of "Upper Caste " people having built of big timbers. Oftenly the complete use of entire tree is noticed. The use of wooden sheets for different purposes by these upper caste depicts the preferential higher use of timber by them as the house made by these caste groups are comparatively larger than the tribes.

People recall the status of their protected forest during 1950-60 when there were more number of wild animals viz Tigers, Elephants, Sambar, *Kutra*, Bhalu(bears), Peacocks, Vana Kukuda (wild fowl), *Baraha*, Deer. Frequently crop menace by elephants, Sambar and Kutra were noticed. Peoples' perception indicate people felt scared while entering forest at that period. A ground of 10-12 people with bows and arrows were entering to the forest for collection of forest products. Kardi (Young bamboo shoots).

Advent of Christians to the village since 1975-80 has been gradually altering the economic situation of ancient Bhuyan tribes. Christian tribes usually work in the mining areas in Sundargarh district and in Rourkela Steel Plant (RSP)as daily wage labourers. Some of them also work as a regular staff in RSP. After they retire usually don't go back to their native. The migration of Christian tribes to Sundargarh can be assigned to :-

1 Due to over population in their own family in Bihar, they migrate in search of their livelihood and establish themselves where they work.
2 They are notorious in nature. They also tend to hide in the forests to avoid being caught.

During initial phases they by adopting brotherhood with local inhabitants, later purchase the lands of Bhuyan tribes. During festive and other occasions of happiness, they (Christians) ofter Bhuyans with country liquour (Mahuli) and during the stage of sub-consciousness, they bargain for lands which is pretty cheap and purchase it by giving them money (although the purchase of registered lands have been noticed low). Other factors attributed regarding the Bhuyans to be very poor landholder due to the fact that:-

1. Bhuyans are lazy in nature and they feel shifting cultivation as a easy method to grow their crops.
2. They don't prefer loss/benefit analysis in this process of Podu cultivation.
3. They try to retain their traditions existing from Kings' period.

Management of forests – institutional perspective

As per the history of this forest say, there had been no such drastic clash between the villagers with its surrounding villagers / communities. As per previous section of forest degradation, it had not necessitated any significant immediate step to protect forest. However, gradual conversion of homogeneous village into heterogeneity and hence accordingly the biotic pressure on forest for timber and firewood, increase in Bhuyan population – leading to increased pressure for shifting cultivation, dependency of other surrounding village communities on forest for forest based products led increased pressure on this forest ecosystem.

During 1994, singleman leadership by Shri Aswini Kumari Mahanta had initiated the process of forest protection. His endeavour with the presence of State Forest Officials during a village festival "Gramsiri Puja" inside village forest had enabled the villagers to take a step towards protection of the forest for the wellbeing of the village community. "Gramsiri Puja" is a tradition of worshipping village deity to pray for the well being of the village community. Aswini found it to be the right platform to make aware of forest protection ideas and formation of village forest protection committees with participation of Forest Department. The forest is jointly managed since then. Although Talbahali Forest Protection Committee (Talbahali Vana Samrakhyan Samiti) has been registered in VSS list of Bonai Forest Division, no microplans have yet been prepared.

Structure of talbahali vss:

During initial phase a fourteen membered committee was formed which has not undergone any change since then. The members included the forester of Bonai range and other villagers. The members with their respective castes are as under:

Tab- 2.5 : VSS members with their respective position and caste

Sl. No	Members	Position in VSS	Caste
1	Shri Harekrushna Kalo	President	Bhuyan (ST)
2	Shri Aswini Kumar Mohanta	Chairman	Mohanta (Khayetriya)
3	Shri Chandrasekhar Gadanayak (Forester)	Secretary	Forester
4	Shri Sukadev Mohanta	Member	Mahanta
5	Shri Pandav Chandra Luhura	Member	Luhura (ST)
6	Shri Dugan Munda	Member	Kolha (ST)
7	Shri Maheswar Mohanta	Member	Mahanta
8	Shri Dhabaleswar Munda	Member	Kolha (ST)
9	Shri Arjun Bhumij	Member	Bhumij (ST)
10	Shri Chapi Nayak	Member	Bhuyan (ST)
11	Purna Chandra Mahanta	Member	Mahanta
12	Shri Surasen Munda	Member	Kolha (ST)
13	Shri Nageswar Bhumij	Member	Bhumij (ST)
14	Shri Sahan Munda	Member	Kolha (ST)

The structure of above VSS indicates there are nine members from scheduled tribe in proportion to the village tribal population. It further reveals a lacuna in this VSS in contrast to JFM-resolution is that there is not single woman in this VSS due to the fact that

- VSS formation had been done loosely and inappropriately. It was done for the sake of doing it and registrating in the VSS list.
- Since all other villagers are the members of General body including women, villagers did not wish to nominate any women since, the practically women take very little role in decision making.

Objectives of vss formation :-

Although there had not been a detailed mention in the Talbahali VSS resolution / meeting register which is very loosely maintained, as per villagers perception, it was primarily formed to address the collowing basic reasons:

i) To harvest timber for house construction during the time of need.
ii) To avail varieties of non-timber forest products which is important for their livelihood purposes alongwith medicinal plants.
iii) To fight forest fire.

Vigilance over the forest :

Prior to formation of VSS in Talbahali, there was no vigilance over the forest. All villagers alongwith surrounding villages have almost free access to the resource. After the VSS formation daily 2 watchers were appointed on voluntary and rotation basis to safeguard the forest resource. During this process, all HHs of the village were participating equally, irrespective of any caste and religion. Higher castes such as Mohanta and Mahakula although personally did not watch forests rather "Bhutiyas" were appointed during 7 AM to 12 noon and 2PM-4PM after their lunch. The watchers move within the forest with a "thenga" (wooden stick) and start patrolling from Khesra forest to Khandadhar DPF onwards. The offence was brought to notice of the villagers who were caught red handed. The wood cutter were noticed to be clever often. The culprit sometimes climb the tree, cut the upper soft stem, chop off the lateral branches and finally the main trunk so as to minimise the felling sound. During pre-protection period, the safeguarding was done by just keeping an eye on it. Any outsiders entering to the forest was simply "thretened" of taking the matter to the villagers of Talbahali and later to his respective village for any social punishment. During the same year Forest Department had also planted different multipurpose tree species. The objective of the Plantation was to create interest of the villagers towards watching of the forest through these tree species. The planted tree species included *Saguan* (teak), *Panash* (Jackfruit), *Amba* (Mango), *Arjun*, *Jamu; Kaju* (Cashew), *Sisoo, Chakunda, Acacia, Sirish* in both Khesra and DPF. Plantation of these tree species done around the periphery of protected forest.

The forest protection process stopped in the year 1999. However, the forest frequently put fire during NTFP collection season and podu cultivation which often spread over the forest were fought only after the formation of VSS. However, it was not fought during pre-VSS formation and stopped watching in 1999.

The reason attributed to pre-VSS formation period in which forest fire was not fought due to the fact that, since most of the trees are big green trees hence, it can resist fire. Forest fire readily burns other small trees and undergrowth.

However, absence of interest in fighting forest fire during this year (yr. 2000) was due to following facts:

1. During the year 1999, forester of Bonai range had paid Rs. 200.00 to each forest protecting villages to act against forest fire. The person received on behalf on Talbahali VSS has been said to be "eaten" up the money. The committee is not so strongly organized and did not take immediate and important step against that person. Unfortunately, that man also died after 3 months. The general attitude hence became "one is eating money and others are fighting fire".
2. It Is of villagers common experience the older big green trees do not catch fire easily, which small trees usually do. During forest fire, since villagers feel, the large timbers are intact do not show considerable interest to fight against it.
3. Although forest fire had detrimental effect on forest future, these inhabitants the Bhuyans in particular, have a belief that during summer, forest fire adds double benefits as

    a. It eases Mahula collection by clearing the forest ground.

b. The ash is then washed downwards to increase the nutrients content of their existing land for agriculture.

4. Oftenly culprits putting fire are handed over to FD. But FD releases the culprits many times without any punishment or monetary fines etc. Most of the cases the culprit gets released after giving bribes to the FD. This retards the interest of the community. During 1999, a village woman was brought to Forest Department's notice during Mahula collection. Forest Officials came to the village, but no action was taken against her since she was a woman. Later, the woman scolded the villagers who had complained against her.
5. During plantation of multipurpose tree species in the periphery of the protected forest during watching the forest fire was put off during their watching time period. But since all plantation have been grown up no watching is required for these plantations forest fires.
6. Bachelors of the village community primarily were tackling of forest fire. During last two years most got married. The couples migrate to towns during summer and winter for wage labour. They only come back to village during agricultural season. Since active bachelors are no more within the period of forest fire, it is not faught.

However no remuneration is paid to watchers and persons fighting forest fires.

Rules and regulations made by the vss:-

Some of the rules and regulations were formulated by the VSS members in presence of the forester during the year 1994 which since then had not undergone any changes. They are as follows:

1. Regular meetings related to forest are to be held monthly by the village community and quarterly in presence of the forester.
2. All members irrespective of Executive Committee and General body can participate in the meetings.
3. All participants have to obey the president till the end of the meeting.
4. Punishment and penalty will be imposed on the persons putting forest fires. Person(s) helping in identifying the culprit will be rewarded.
5. Tree species such as Mahul, Kusum, Asan, Kendu and Char trees cannot be cut either from forest or bunds without prior permission of the committee.
6. The persons(s) in need of timber for house construction / repair is (are) to request to the committee through a written application. The matter will be discussed in the village forest meeting and then permission will be given. Some of the committee members investigate the timber requirement of the person and then select a matured and older tree (s) for the applicant. However, the applicant has not to pay any nominal fees for the same (since, the records are very loosely maintained exact cases of timber fulfilment couldn't be assessed).
7. Podu Cultivation are to be stopped immediately and cases against the Podu cultivators will be lodged if they do not obey further (Here lies a flaw in rule formulation. This was formulated by the FD officials as per JFM norms. However, the committee is not rigid in keeping this rule intact keeeping livelihood interest of Bhuyan community safe). Also refer "Podu cultivation" section.
8. The VSS will function in accordance with consultation of the forester and forest guard.
9. The cleaning materials after meeting the needs of forest dependency communities will be supplied to other villages, if the urgency is felt.
10. Cleaning and thinning operations will be managed according to decision of the committee.
11. Extraction of fencing materials from the forest also needs to be permitted by the VSS.
12. Penalty against illegal cutting of trees may vary from Rs. 20.00 to Rs. 1000.00 / person held during cutting it depending on the timber value.

Above mentioned regulations although seem fairly ideal it is rarely idealistically maintained.

Cleaning and thinning operations:

The next consecutive three years after the VSS formation were subjected to annual cleaning and thinning opeations. First cleaning operation was carried out during 1995 and only Khèsra forest was cleaned. Single person from each HH participated in the operation. Initial operation yielded

135 head loads of cleaned material. During 1996, it was 200 headloads (approximately figure as per villagers perception there has been no such mention in village forest record book) and during 1997 it was roughly 160 headloads. The variation due to such cleaning outputs are due to:

1. Number of participating villagers varied.
2. Khesra forest is dominated by Sal trees where the underground growth is poor hence the cleaning output.
3. DPF is highly dense with shrubs, climbers and other undergrowths. Hence during 1996, increased manpower contribution, lower hill region and higher undergrowth density added the cleaned product.
4. During 1997, the region assigned for cleaning operation was on higher altitude and rocky which people did not prefer and the output was not adequate.

The committee has not formulated any rules towards equitable sharing of forest products including firewood cleaning outputs. However, it silently explains to a fair degree. Restriction of one person per HH ensures equal carrying of cleaning outputs. Other salient features of cleaning operations are:-

1. Only shrubs, climbers, distorted / diseased / dead tree branches are cut.
2. Cleaning operation carried out in a single day / yr.
3. A headload of cleaning material is allowed.
4. Any person missing the opportunity his/her legal chance to get cleaning output is forfeited.

The villagers legally although not satisfied the existing norms of the committee they manage the entire firewood need by timely firewood collection. Firewood collection primarily included shrubs such as " Bambai lati".

Role of Forest Department

As per people's perception, FD had provided Gas light and mats during earlier days of VSS formation. Furthermore, Rs. 200.00 (Rupees two hundred only) was paid to each VSSs alongwith Talbahali VSS towards a safe deposit and to be used during forest fire. However, the Forest Department plays no role in its required activities. On the otherhand, people help the Department in holding the culprits but the department releases the culprits after some bribe. Oftenly, due to callousness of the FD the culprits are released. However, people are confident to take steps against the foresters through the help of Aswini Mahanta to write application to DFO against them, if adequate legal steps are not taken against the culprits.

Function of Talbahali vss:

During initial phases i.e. during 1994, meetings were conducted regularly at every three months where all VSS members, Forest Department officials and villagers were participating. During these initial period only Forest awareness were done. These meetings continued for a year but then it became random. Meetings were held due to Aswini's role. But Aswini's other involvement / engagement deregularised the process and loss of people's interest. The next meeting date was finalised from the previous meetings.

"Podu cultivation"

"Podu literally means "slash and fire" where all the undergrowths of the forest are slashed and put under fire so as to clear the ground. Podu cultivation is the traditional agricultural practice followed by ancient Bhuyans still today. They feel they have retained their land use rights since king's period.

Methods of Podu Cultivation:

The ancient Bhuyans usually prefer fresh green forest area for Podu cultivation. The selectively clear trees. Economical tree species such as Mahul, Kusum, Char, Kendu, Anla, Sal are left untouched and never hacked. Other small tree species of lower economic value alongwith shrubs such as "Bombai lati" are cut and brought home for fuel wood purposes. The forest patches after

being cleared are left for 15-30 days for drying. Which are not usually brought home and then put under fire. The clearing of patches starts with the end of agricultural operations during monsoon (the patches used during monsoon are used for paddy cultivation). On an average, one Bhuyan HH uses 2 acres of forest land for Podu cultivation. After being burnt, the patch is sowed with blackgram seeds. The peculiarity lies with the fact that they do not plough the land. Since this operation is carried only after monsoon, the washout of the biomass ash to lower lands are low. The patch is cultivated for two consecutive years. The crop is not disturbed after it is sown. During Magh (December - January) the crop is ready to harvest. No further land processing is carried out after blackgram is harvested.

During 2nd year, a wild variety crop (locally called as "*Gangei*") is cultivated. It is assumed that the land does not loose its vigour in the 2nd year although first crop has already been practiced and harvested (the probable reason could be nitrogen fixation by blackgram crop). *Gangei* after collected, the land is left fallow for years. During 3rd year, the tribes search for new forest patch to undertake such activities. It is presumed that Bhuyans follow a 10 years rotation cycle for Podu Cultivation. However, the rotation cycle of 10 yrs has presently reduced to 5 yrs rotation. The reasons assigned are:-

1. Prior to migration of tribes from Ranchi, the forest was exclusively used by Bhuyans. After their arrival, the forestlands cultivated by Bhuyans for two years are captured by migrated Christians. The migrated Christians continue agriculture over years. Bhuyans instead of cutting fresh forest area, go back to earlier prior cultivated areas which are of left for short fallow for five to six years.

2. The forest area used for shifting cultivation before protection initiatives were large. During the year 1994, the forest was declared as Demarcated Protected Forest. After its declaration, there had been reduction of rotation period as the area left for Podu cultivation are low. This also led the Bhuyans to repeat their agriculture in short duration fallow lands.

Section - 3:

Participatory Vegetation Monitoring

Participatory Vegetation Monitoring

As one of the prime objectives of the EERN phase II, peoples' participation in the resource monitoring process was given importance to narrow down the gap between the researchers' findings and villagers' understanding about the forest resource and to draw fruitful conclusions to make aware of the villagers about the vegetation status.

Objectives:

1. To assess the feasibility of participatory vegetation monitoring and response of village community and Forest Department.
2. To assess resources/ efforts required
3. To test the methodology.
4. To assess the utility of participatory vegetation monitoring to communities and forest department.

Methodology

A small training programme was conducted with the help of interested and dynamic villagers selected by the village forest protection committee in the during the village meeting to train them about measurement of tree, shrub, herb and tree regeneration and to draw simple and fruitful conclusions. The above formats for vegetation monitoring were translated to *Odiya* (Oriya) and were supplied to the participating villagers. Handouts mentioning the objectives, methodology, outcomes and utility of the studies were also translated for easy understanding. Later, they were taken to the nearest forest patch for demonstration and practice. Participating members themselves practised in the presence of researchers. Doubts raised during the process were clarified and other easy tips were given to them.

The group was divided into subgroups for NTFP monitoring. A sub group of four persons were given the charge NTFPs of a particular season. The detailed techniques of NTFP yield monitoring were trained to them. A questionnaire for NTFP harvest monitoring were also handed over to them for recording for that season.

Table 3.1: Objective and parameters

Objectives / issue	Parameters	Method
a. Assessment of PFM feasibility and response of village community and FD	a. Reasons of forest degradation b. Triggering factor assessment towards forest protection c. Organizing of village community to protect forest d. Liasoning with FD e. No. of conflict cases raised and solved with help of FD and Village community f. Steps taken by FD and village committee to solve conflict cases. g. Mechanisim of patrolling system (both FD and village committee) h. Responsibility distribution while sharing benefits i. No. of times FD not responded j. Problems associated with villagers in forest protection k. Problems associated with FD in forest protection	a. PRA technical and sub-group discussions. b. Discussions with FD officials.

Objectives / issue	Parameters	Method
b. Assessment of Resources / efforts required	a. To what extent they can monitor b. Assessment of field data collection help required c. Materials they possess / can be utilised	*conversation during village meeting*
c. Methodology test for vegetation monitoring :-	a. Assessment of any existing (traditional) knowledge in practice b. If no, would they follow the technical methodology c. No of persons interested during meeting and training d. No. of persons could follow the technique in the forest site while training and vegetation monitoring. e. Ease in data analysis f. Assessment of type and extent of confusions.	*PRA exercise and field observation*
d. Assessment of utility of PFM to communities and FD	a. Assessment of steps taken by village community after sharing of study findings. b. Rectification in micro-plan by FD c. Any constructive and / or destructive taken by village community d. Change rectification in management system.	*observation after sharing information*

3.2 Vegetation Methods

Site		Quadrat Size	No. of Quadrats				Inputs provided
Gadabani kilo	**Forest patches**		Tree	Tree Regens.	Shrubs	Herbs	Ropes= 50m=4pieces
	Belabani	Tree/climbers = 50mX50m	4	8	8	10	Ropes = 10m=4 piece
	Godabandha		4	8	8	12	Tailoring = 4
	Mahulabani	Shrubs/tree	4	8	8	12	Tapes
	Mahuladunga	Regeneration = 10m X 10m	4	8	8	8	Hand outs (methodology written in oriya) to all participating villagers
	Gochar	Herbs = 1m X 1m	2	4	4	10	
	Padar		2	4	4	10	
	Uncleaned Forest patch		4	8	8	8	
			24	48	48	60	

Karadapal		Reserve forest	8	16	16	16	-do-
		Rev. forest	4	8	8	8	
			12	24	24	24	
Suruguda		Sal belt	4	8	8	16	-do-
		Bamboo belt	4	8	8	16	
Baghamunda		Entire forest	4	8	8	16	-do-
Talbahali		Uncultivated forest patch	4	8	8	10	-do-
		Podu cultivated 10 yrs fallow land	2	4	4	8	

3.3 Involvement of NGO

Out of total 5 sites in 4 sites viz. Karadapal, Suruguda, Baghamunda and Talbahali NGOs workers and people from people's organization were involved in the process. Following table gives the details.

Sites	NGO Name & address/ Peoples' organisation	No. of NGO personnel involved
Karadapal	1. **KIRDIT** Harichandanpur, Keonjhar	1
	2. **Regional Forest Protection Committee**, Karandapal	1
Suruguda	1. **Mahulpalli Yuvak Sangh**, Mahulipali, Sundargarh	1
	2. **Banani**, Sundargarh	4
Baghmunda	1. **SAHAJOG** Baghamunda, Deogarh	1
	2. **Zilla Jungle Manch**, Deogarh, Chandankhunti, Deogarh	1
Talbahali	**YAVARD,** Sukhpali, Lahunipada Sundargarh	1

Involvement of Forest Department:

For Suruguda village, the Local Froest Range Officers has shown his keen interest in the process. Due to his other responsibility he although directly could not participate helped in appointing 2 forest guards in the entire process. In Talbahali which is a demarcated protected forest, discussions with the DFO and Range officer were done but no Forest Guard Participated.

3.4 Features of the villages selected:

Name of sites	Status of forest	Gadabanikilo	Karadapal	Suruguda	Baghmunda	Talbahali
Forest area	Revenue Reserve DPF Social Forestry	130 ha 12ha	60 ha 12000 ha	- 200 AC (80 ha) 28 Acres	- 200 ha	100 ha 464.41 ha
JFM area		Nil	Nil	200 AC	Nil	464.41 ha
When JFM initiated		Forest protection initiated since 1940	Forest Protection since 1975	Protection started in 1985 & in 1989 FD assisted in shaping VSS	Protection since 1993	Protection since 1994

3.5 Participation of stakeholders in Vegetation monitoring (No. of participation)

Name of sites	Gadabanikilo	Karadapal	Suruguda	Baghmunda	Talbahali
President of CFM JFM	1 -	1 -	- -	1 -	 -
VFC / FPC committee member	3	5	3	7	1
No. of women	-	6	-	12	-
No. of youths	9	4	4(tribals)	3	4
Forest guards	-	-	2	-	-
NGO members	-	1	5	1	1
Members from peoples' organisation	-	1	-	1(other 2 from surrounding villages)	-

3.6 Human effort utilisedHuman effort required for monitoring

Sites	Quadrat No	size	No. of days	Person days total	Total cost
Gadabanikilo	24 48 60	50m x 50m 10m x 10m 1m x 1m	14 days (within same day information related to shrubs, climbers tree regenerating and herbs were collected	Avg. person days Total = 7 x 14 = 98	Rs 3920.00 Actual cost paid = Rs 560.00
Karadapal	12 24 24	50m x 50m 10m x 10m 1m x 1m	9 days	Average person days=6.5 Total person days = 6.5 x 9 = 58.5	Rs. 2340.00 Actual cost paid =700.00(as donation to KFPC)

Suruguda	8 16 32	50m x 50m 10m x 10m 1m x 1m	7 days	Average person days= 7 Total person days 7 x 7 = 49	Rs 1960.00 Actual cost Paid = Rs 1140.00 (to tribals
Baghamunda	4 8 16	50m x 50m 10m x 10m 1m x 1m	7 days	Average person days = 13.5 Total person days = 13.5 x 7= 94.5	Rs. 3780.00
Talabahali	10 20 31	50m x 50m 10m x 10m 1m x 1m	6 days	Average person days = 4.33 Total person days = 4.33 x 6= 25.98	Rs. 1039.20 Actual cost paid = Rs. 960.00

3.7 **Cost of Monitoring** (Labour cost and other input cost.)

Sites	Labour cost	Other inputs cost	Cost of food	Voluntary
Gadabanikilo	Rs 560.00	Rs 278.00	00.00	00.00 Nil
Karadapal	Rs 700.00 (donated to KFPC)	Rs 110.00	00.00	Nil
Suruguda	Rs 1, 140.00	Rs 75.00	00.00	Nil
Baghamunda	Rs. 00.00	Rs 82.00	00.00	Voluntary service
Talabahali	Rs 960.00	Rs 75.00	00.00	Nil

3.8 **Utility of information**:

Out of total five sites (village)study findings have been presented to Gadabanikilo and Karadapal villagers. The study finding report has been given to Ujjalpur Range officer (for suruguda village)

Response / Perceptions:

1. The information has been shared with the villagers of Gadabanikilo and Karadapal. All participating villagers irrespective of any group has shown considerable interest to know their status of the forest. The shared information included the density of tree species in different forests/ forest patches, MAI, NTFP yield of total forest. The NTFP yields of the forest were monetised (Gadabanikilo & Karadapal) and their HH share were determined. The HH income from the NTFPs from their managed forest fascinated then.

2. The economic value of forest (based on NTFP yield monitoring) being managed by the village community was of more interest that the ecological information.

3. Based on the quantity of Char seeds (Buchanania lanzan) produced (estimated figure) in Gadabanikilo forest and its unit selling price, it was noticed that 7 – 8HHs of higher caste have started trading Char seeds this year (yr 2000), which was once undermined as the work of lower social categories such as SCs and STs within the village.

4. Based on the minimum procurement price for Char seeds (unprocessed) as fixed by Govt. of Orissa (Rs. 50.00/Kg) mentioned in the report, the bargaining capability of villagers with the traders has been augmented. Rate of unit selling price for Char seeds (unprocessed) was Rs. 8.00/Kg(1998) increased to Rs. 25.00-35.00 / kg(2000)

5. Gadabanikilo Village Committee is thinking to take the steps of equitable sharing of Char seeds (it has the mechanisms of equitable sharing of Mahula seeds) from this year owing to the benefit flow to few HHs this year.

6. *Serious repersussion*. - Gadabanikilo Village Committee had earlier decided to stop the access of Char seeds to tribes (Sabara) of surrounding villages such as Sanapathuria, Badapathuria, Giridharpur and others after realising the value of Char seeds. This has margnialised the livelihood opportunities of these tribes based on the Char seeds. After discussions they have thought to impose some nominal entry fees for these tribes.

7. Sharing of the Gadabanikilo forest status report with the members of Maa Maninag Jungle *Surakshya* Parishad (MMJSP). Ranpur (MMJSP is a federation of all forest protecting villages under Ranpur block, Nayagarh district) has shown "ripple effect" among other villages. All members have made it a resolution to assess all their protected forests (12 clusters, 102 villages) in coming years. Assessment of forests for the sake of village recognition than vegetation status was prevalent in some of the members. The economic value of forest (in terms of NTFPs availability) has attracted most of the members.

8. People are realizing the ecological information gradually. Baghamunda, Chandankhunti and five other surrounding villages (Deogarh district) have shown interest towards the vegetation assessments after reading the article on "Gadabanikilo forest status" publised in quarterly oriya newsletter "Bana Barata" published by VASUNDHARA. Baghamunda village has been included in EERN research activities and villagers of Chandakhunti (3 villagers) have taken part in training at Baghamunda vegetation monitoring.

9. Response from Forest Department - All forest range officers of JFM sites have shown interest in this technical studies. As per them, although Forest Department has a research cell, research activities are not carried out due to some reasons. The range officer of Ujjalpur Forest Range had been involved with the data analysis of 3rd site i.e. Suruguda village and two forest guards joined during the monitoring processes.

3.9 Lessions :-

1. A technical study is a difficult assessment for the villagers. Hence, the interested village youths were to be selected for the process. Village youths included primarily the college students and high school teachers and other literate youths. However, participation of mechanical engineer and one economics professor in the study sites have also been quite inspiring.

2. A initial village meeting of 60-70 people gets reduced into 15-20 persons due to lack of interest in the technical assessment of vegetation. Gradual decline of people's interest of over days of vegetation monitoring were noticed. Thus, the villagers are to be motivated to realise and utilise the information.

3. A general notion was noticed in some of the villages that "the researchers are paid by respective organisations". Villagers participating in the process have to compromise with their livelihood often (Suruguda and Talbahali). Villagers were often to be hired. But self motivated and dedicated villagers have volunteered to great extent. They felt as if they are socially recognised due to this unique process (Mahila Samiti, Baghamunda)

4. Record keeping: There was a gradual decline in interest of people in record keeping due to lack of patience. Hence, they had to be supported morally. But it was noticed, when their name was written in their village report self - motivation led the process forward further.

5. Data analysis: - it could be made only possible through the interested youths.

6. Presentation of study findings: - In Kardapal due to inter-village and intra-village conflicts, villagers participating in the process of sharing information were noticed low. However, the president and secretary have taken the responsibility to share this information with the villagers in the successive meetings in amore convincing way. All villagers participated in information sharing session were impressed to know their forest.

Assessment of traditional knowledge in practice to monitor forest, Baghamunda, Deogarh (Questions asked to forest protecting women members)

1. *Area of forest protecting ?*

Ans : 500 Ac

2. *When did the protection start ?*

Ans : During 1992 by men and 1993 by women.

3. *How did the protection started?*

Ans : Men avoided forest protection due to conflicts with surrounding villages and then they gave up protection. Surrounding villagers cut the trees rithlessly. We finally decided to protect the forest.

4. *What was the condition of forest during forest protection?*

Ans : Barren land. Vegetation was bushy. We took care of all plants like our own childs. In case of any conflicts we simply forwarded the matter to their respective forest protection committees to take proper actions where they were comeplled to pay some fines.

5. *The mechanisms of forest protection?*

Ans : every day 5 women are watching the forest. we start at 7.00-8.00am till 12.00noon.

6. *Tree species existing during forest protection initiation: trees, tree regeneration, shrubs, herbs, climbers, lianas etc.?*

Ans : Mahul, Kendu and Dhubuni (rare).

7. *Species existing now?*

Ans: they said all species mentioned in the ecological section of vegetation analysis os this report. All regeneration of each species were existing then but now all have attained the size of tree bole size.

8. *No of years taken for change of forest conditions?*

Ans : 8-10 years

9. *What is the unit of measurement of tree height, girth, spread, canopy, annual growth?*

Ans :

Height

Height of the tree growth is comapared with the growth of bamboo. As per one woman the Sal tree grows "Baunshey" i.e. height of a single bamboo in few years and that of Mahul (*Madhuca indica*) " Adh Baunshey" (half of the bamboo) during the same period.

Girth

Girth is measured in the unit of length of single hand (haath). A tree of one haath becomes one and half and so on.

Canopy

The canopy of the trees are compared with the radius of crop yard used for crop thrashing

10. How do they measure annual growth?

Ans : as per them, the trees grow from *antey* (waist height) to *beke* (shoulder height) to mundey (complete man height)etc.

11. What is the density of each species in the forest?

Ans : earlier it was 7-8 trees (10 haath X 10 haath) has increased to 25 –30 trees in the same area.

12. No of trees good, bad, cut, dead, decayed, diseased etc?

Ans : roughly 3-4 (100 sq haaths) and now not noticed.

13. Types NTFPs found before forest protection and now?

Ans : only Kendu fruits and Mahul, now almost all species yielding fruits and other products. Streams were not flowing before but now stream has regained its original flow.

14. Amount of NTFPs produced in their forest?

Ans : one Mahula tree yielded 3-4 bojh (2 – 3q) but now the total mahua collection has reached to 25-30 q.

15. Status of tree regeneration before forest protection and after it?

Ans: All regenerations are intact.

16. Types of medicinal plants present then and now, what's their perception now?

Ans : all medicinal plants were existing before and are also noticed now. According to local Vaidya (traditional medicine practioner), chetaki harida (a sub species of *T. chebula*) was present earler but not noticed now as it was cut to use as fuel in brick kilns.

17. Do they follow any specific traditional technique for the assessment of forest conditions?

Ans : No

18. If yes, what is it and the technique?

19. If no, would they like to know the technique to assess it?

Ans : yes

Section - 4:

Ecological Assessment of Different Forest Management Systems

VILLAGE: GADABANIKILO

Gadabanikilo represents miscellaneous type of tropical moist deciduous forest. It is dominant in moist deciduous type of species. Details of vegetation study shows some difference in species structure in different forest patches but dominance of some species in all forest patches. As already mentioned, different forest patches of protected forest are also subjected to different management and use practices, basically thinning, pruning and cleaning of shrubs etc for fuelwood supplements, it has affected the growth of the tree species depending on operations. The growth, regeneration, recruitment and successful establishment of the species vary. Hence, different ecological parameters such as density of trees, their population structure, density of tree regeneration, density of undergrowth are determined for each species of each forest patches based on management operations to establish the relations between growth of the species and management practices of forest patches. The important value of each tree species are also determined to show the relations of different forest management activities to the importance of a species representing an ecosystem. Similarly these forests also represent a variety of species. To get a clear picture, diversity indices of all plant forms are also determined to quantify the diversity of different plant forms. Since, vegetation structures of different forest patches are also different, it is also useful to determine the canopy cover and its effect on different undergrowth status. It is also useful to notice the effect of protection on growth of tree species hence, the effect of management practices on increment of the total forest. Hence, it is worthy to determine the annual increment of each patch to determine the production level of the forest and desirable level of harvest.

Trees

Density

Density of tree species in different forest patches on comparison indicates a picture of dominance of few species over others. The species namely, Mahula (*Madhuca indica*) and Char (*Buchanania lanzan*) almost present in every patches and representing greater than fifty percent of total density of all trees. In open forests such as Padar and mahuladunga and other cleaning forest patches the dominance of Mahula is well observed. Mahuladunga (density of teak refers to teak plantation) and Mahulabani are exclusive of this species representing the more than 80% of total tree species. In contrast to patches that are disturbed due to regular cleaning operations, this dominance prevails in contrast to undisturbed patches the species composition approaches towards more evenness. Mahula dominant in cleaning patches found to be at fifth place allowing the softwood timber species to dominate in uncleaned patch. Next to Mahula, Char is equally dominant over other species.

A closer look to all cleaned patches versus undisturbed patch represents dominance of NTFP species in cleaned patches. On the other hand, the soft wood timber species (two species such as Nirash and kalachua) are dominant representing one third of total species. In almost all forest patches, total percent of NTFP species represent almost fifty percent of total species representing the forest (also refer chart 10).

Regeneration

Here regeneration refers to tree regeneration (saplings and seedlings) of all species existing in these forest ecosystems. Density of tree saplings in different forest patches shows that tree species are regenerating well in their natural conditions. In all cleaning patches, the NTFP species are dominantly regenerating than other species in contrast to uncleaned patch. Belabani in contrast to other cleaning operations is a deviation to this trend. It represents same species richness of tree species to that of uncleaned patches in which the soft wood species are dominating. Belabani (the name indicates "Bel forest" is according to the dominance of this species) represents higher dominance of Bel saplings as a NTFP species.

Tree seedlings represent a different status of regeneration in contrast to tree saplings. In almost all sites irrespective of cleaned or not, the regeneration stand shows the dominance of timber species. The exception is noticed in Mahulabani and Mahuladunga the prime sites of mahula collection It shows greater Mahula seedling density than other patches The density of Mahula

seedlings range upto 1750 seedlings/ ha and 1500 seedlings / ha in these patches respectively in contrast to other sites that raise this density from 50 seedlings / ha to 350 seedlings / ha in all other patches.

Size class distribution of tree species

Size class distribuition (please refer charts 1 to 7) of dominant tree species indicates irrespective of any forest patch and any management practices or uses the forest represent its younger stages of succession. Density of almost all species represents maximum density in 30cm to 50 cm girth class than other girth classes. Forest patches such as Gochar land shows normal size class patterns of distribution. The peak of Mahula distribution at 51cms to 70 cms and declining further. Char represents similar trend in case of Padar. Density of Kumbhi is equally represented in both existing patches.

Standing Woody Biomass(SWB)

Standing Woody Biomass is weight of all woody biomass per unit area present in an ecosystem at a given point of time. The SWB of same forest patches at two given points of time *i.e.* during October 1995 and February 1999. The data clearly indicates the degree of increase in SWB in different forest patches. The data also relates the growth of biomass of different forest patches, which are operated by regular cleaning operations to undisturbed patches. Uncleaned patch indicates highest SWB than other forest patches.

Mean Annual Increment (MAI)

Mean Annual Increment is the arithmetic mean all Current Annual Increment (CAI) to date, where CAI refers to the increase in volume of a wood during a year.

MAI of different forest patches represents different annual increments which are subjected to different management practices. It is observed there is significant growth in terms of MAI in Belabani, Godabandha, Mahulabani and Mahula dunga which are regularly cleaned. On the other hand although Padar patch is cleaned regularly, due to low tree density, it has low MAI. In contrast to cleaning patches the uncleaned patches represent low MAI than cleaning patches although it is rich in species richness.

Canopy cover

Canopy cover of different forest patches represents different degrees of cover status. Uncleaned patch represents highest canopy cover than other forest patches. This is due to the extensive growth of small trees such as Nirash and Kaluchua. Canopy cover of other patches ranges from 13% in open forests such as Padar and Gochar to 57% in Belabani patch.

Shrubs

Shrubs are related to the density of the tree species and canopy cover that ultimately determined by the management operations in different patches. The density of shrubs depend on the extent of open space to grow. It is well observed that patches such as Belabani and Uncleaned patch, the diversity of shrubs are low. In these patches, single shrub species dominate over others shrub species. On the other hand, the disturbed patches shows grater diversity of shrubs allowing other species to grow and establish. In these forest patches species evenness is well observed indicating that disturbance is a facilitator of species diversity. Increase in intensity of the disturbance in these patch leads to greater diversity as seen in case of Padar land

Herbs

Similar trend to shrubs is noticed in herb studies as well. The density and diversity of herbs are related to the disturbance factor. In cleaned sites the diversity of herbs is higher than other undisturbed patches. In case of uncleaned patches the dominance of single species over the other species is noticed than in other disturbed patches.

Both patches such as Belabani and uncleaned patches shows similarity in herb and shrub density and diversity trend although both are different in management practices. Belabani is shows no disturbance in recent years and hence represent similar trend in shrub and herb diversity with the uncleaned patches.

KARADAPAL

Tree

Density

Karadapal forest represents Northern Tropical Dry Deciduous Forest. It is dominant in dry deciduous type of species. Details of vegetation study relate different species structure in forest patches. The analysis of forest patches shows that both the Reserve and Revenue forest are dominant with Sal species and represent quite young stage of dominant tree species in the forest. Both the forest shows maximum density of Sal tree species in the girth class of 30 – 50 cms and gradually decrease towards higher girth class. This is due to the fact that coppice Sal shoots grown into forests represent the forest. Next to Sal, other dominating species are Char and Mahula. Both forest patches are dominant in sole timber yielding species *i.e* Sal. Sal constitutes 50% and 83% in Atei Reserve Forest and Revenue Forest respectively. Sal also behaves as a NTFP species along other NTFP species. Atei Reserve Forest dominates in NTFP species than Revenue forest. Sal along with karada and Char constitutes 64% in the Atei Reserve Forest but Sal constitutes 88% along with Char.

Regeneration

Sal regenerates well in both types of forests. It is also noticed that both types of forests show greater regeneration of NTFP species as compared to the other timber yielding species.

Tree seedlings represent parallel to tree saplings and trees. It also represents dominance of NTFP species in both forest types along with Sal.

Important Value Index (IVI)

Analysis of IVI in both types of forest patches Sal shows greater importance value over other species followed by other NTFP species. Thus both types of forest show greater importance value of NTFP species than timber species.

Standing Woody Biomass(SWB)

In comparison of both forest patches SWB of Reserve Forest shows greater SWB than Revenue Forest.

Mean Annual Increment (MAI)

MAI of all tree species for Karadapal is calculated by assuming the MAI to be 2.84% of total SWB of forest patches. It shows MAI of tree species in the Reserve Forest is greater than Revenue Forest (please refer to table 3.9).

Shrubs

Shrub density are related to density of tree species and canopy cover. The density of shrubs depend on the extent of open space to grow. The density and diversity of shrub species are higher than Revenue Forest. Reserve Forest also has some NTFP shrub species such as Chirayita (*Swertia chirata*) dominating than Pokasungha. Other shrub NTFPs include Pala (*Phoenix spp.*). on the other hand, Present study in Revenue Forest represents lower shrub density and diversity (it needs to be further supplemented by the another sampling study in the same sampling plot during or after the rainy season to represent better picture).

Herbs

Reserve Forest was completely devoid of herbs due to forest fire (Hence, it also needs to be supplemented by another study).

Table 4.1: Density of trees and % of representation, Belabani, Gadabanikilo.

Sl no	Trees	Density/ha	% representation	Cumulative %
1	Mahul	184	24.73	24.73
2	Char	180	24.19	48.92
3	Kendu	56	7.53	56.45
4	Bhalia	40	5.38	61.83
5	Piasal	36	4.84	66.67
6	Harida	32	4.30	70.97
7	Jamu	24	3.23	74.19
8	Kalachua	24	3.23	77.42
9	Sidha	24	3.23	80.65
10	Benta	20	2.69	83.33
11	Bel	16	2.15	85.48
12	Mai	16	2.15	87.63
13	Ankula	8	1.08	88.71
14	Bheru	8	1.08	89.78
15	Jhadapan	8	1.08	90.86
16	Khakda	8	1.08	91.94
17	Kochila	8	1.08	93.01
18	Amba	4	0.54	93.55
19	Asan	4	0.54	94.09
20	Bahada	4	0.54	94.62
21	Chakunda	4	0.54	95.16
22	Dalsingha	4	0.54	95.70
23	Kakaria	4	0.54	96.24
24	Kala-ankula	4	0.54	96.77
25	Karada	4	0.54	97.31
26	Kashi	4	0.54	97.85
27	Kumbhi	4	0.54	98.39
28	Morian	4	0.54	98.92
29	Nirash	4	0.54	99.46
30	Sunari	4	0.54	**100.00**
		744		

Table 4.2: Density of trees and % of representation, Gochar, Gadabanikilo.

Sl. no	Trees	Density/ha	% representation	Cumulative %
Sl no				
1	Mahul	20	55.56	55.56
2	Kumbhi	16	44.44	100.00
	Total	**36**		

Table 4.3 : Density of trees and % of representation, Godabandha, Gadabanikilo.

Sl. No	Sl. No	Density/ha	% representation	Cumulative %
1	Mahul	228	38.64	38.64
2	Char	104	17.63	56.27
3	Bhalia	42	7.12	63.39
4	Piasal	20	3.39	66.78
5	Aanla	16	2.71	69.49
6	Amba	16	2.71	72.20
7	Bahada	16	2.71	74.91
8	Jhadapana	12	2.03	76.95
9	Kalachua	12	2.03	78.98
10	Sidha	12	2.03	81.01
11	Kochila	10	1.69	82.70
12	Achhu	8	1.36	84.06
13	Benta	8	1.36	85.41

14	Dalasingha	6	1.02	86.43
15	Harida	6	1.02	87.45
16	Kapasia	6	1.02	88.46
17	Luni	6	1.02	89.48
18	Ambalata	4	0.68	91.18
19	Gotha	4	0.68	91.86
20	Jamu	4	0.68	92.54
21	Kantabaula	4	0.68	93.22
22	Kendu	4	0.68	93.90
23	Kumbhi	4	0.68	94.58
24	Bel	2	0.34	94.92
25	Gamhari	2	0.34	95.26
26	Giringa	2	0.34	95.60
27	Jamu	2	0.34	95.94
28	Jantari	2	0.34	96.28
29	Karada	2	0.34	96.62
30	Kerhuan	2	0.34	96.96
31	Khakda	2	0.34	97.30
32	Kochila	2	0.34	97.64
33	Kumbhi	2	0.34	97.98
34	Kusum	2	0.34	98.32
35	Mai	2	0.34	98.66
35	Sahada	4	0.68	99.68
36	Suniari	2	0.34	100.00
	Total	**582**		

Table 4.4: Density of trees and % of representation, Mahulabani, Gadabanikilo.

Sl. No	Tree species	Density/ha	% representation	Cumulative %
1	Mahul	348	81.31	81.31
2	Char	28	6.54	87.85
3	Kendu	16	3.74	91.59
4	Karada	8	1.87	93.46
5	Bahada	4	0.93	94.39
6	Benta	4	0.93	95.32
7	Harida	4	0.93	96.25
8	Kalachua	4	0.93	97.18
9	Kashi	4	0.93	98.11
10	Kochila	4	0.93	99.04
11	Kumbhi	4	0.93	99.97
	Total	**428**		

Table 4.5 Density of trees and % of representation, Padar, Gadabanikilo.

Sl. No	Tree species	Density/ha	% representation	Cumulative %
1	Char	12	42.86	42.86
2	Kumbhi	8	28.57	71.43
3	Amba	4	14.29	85.71
4	Mahul	4	14.29	100.00
	Total	**28**		

Table 4.6.: Density of trees and % of representation, Uncleaned patch, Gadabanikilo.

Sl no	Tree sps	Density (per ha)	% of representation	Cumulative %
1	Nirash	200	20.49	20.49
2	kalachua	116	11.89	32.38
3	Char	64	6.56	38.93

4	Sidha	60	6.15	45.08
5	Mahul	56	5.74	50.82
6	Kochila	52	5.33	56.15
7	Harida	48	4.92	61.07
8	Mai	48	4.92	65.98
9	Bahada	44	4.51	70.49
10	Jhadapan	40	4.10	74.59
11	Karada	36	3.69	78.28
12	Dalsingha	32	3.28	81.56
13	Aanla	28	2.87	84.43
14	Benta	24	2.46	86.89
15	Kashi	20	2.05	88.93
16	Morihan	16	1.64	**90.57**
17	Asan	12	1.23	91.80
18	Bhalia	12	1.23	93.03
19	Kendu	12	1.23	94.26
20	Patuli	12	1.23	95.49
21	Tentuli	12	1.23	96.72
22	Halada	8	0.82	97.54
23	Amba	4	0.41	97.95
24	Jamu	4	0.41	98.36
25	Kumbhi	4	0.41	98.77
26	Lunikoli	4	0.41	99.18
27	Panihalada	4	0.41	99.59
28	Suniari	4	0.41	100.00
	Total	**976**		

Table 4.7: Density of trees and % of representation, Mahuladunga, Gadabanikilo.

Sl no.	**Tree sps**	**Density (per ha)**	**% representation**	**Cumulative %**
1	Mahul	110	91.67	91.67
2	Saguan	10	8.33	100.00
	Total	**120**		

Table 4.8: Density of trees and % of representation, Reserve Forest, Karadapal.

Sl no	**Tree species**	**Density (per ha)**	**% of representation**	**Cumulative %**
1	Sal	370	49.80	49.80
2	Karada	52	7.00	56.80
3	Char	51	6.86	63.66
4	Dhala(Dhaura)	36	4.85	68.51
5	Jamu	26	3.50	72.01
6	Asan	24	3.23	75.24
7	Mahul	24	3.23	78.47
8	Sidha	15	2.02	80.48
9	Bandan	13	1.75	82.23
10	Kantagachha	10	1.35	83.58
11	Kusum	10	1.35	84.93
12	Piasal	10	1.35	86.27
13	Datarangdaru	9	1.21	87.48
14	Kumbhi	8	1.08	88.56
15	Bhalia	7	0.94	89.50
16	Sisoo	7	0.94	90.44
17	Kandrei	6	0.81	91.25
18	Kendu	6	0.81	92.06

19	Pata	6	0.81	92.87
20	Bainchakoli	5	0.67	93.54
21	Sarli	5	0.67	94.21
22	Tilai	5	0.67	94.88
23	Bahada	4	0.54	95.42
24	Harida	4	0.54	95.96
25	Rayu	4	0.54	96.50
26	Bhurkunda	2	0.27	96.77
27	Kashi	2	0.27	97.04
28	Mankadakendu	2	0.27	97.31
29	Peteh	2	0.27	97.58
30	Ame	1	0.13	97.72
31	Banuakanta	1	0.13	97.85
32	Bara	1	0.13	97.98
33	Bel	1	0.13	98.11
34	Daka	1	0.13	98.24
35	Dorli	1	0.13	98.37
36	Gamhari	1	0.13	98.50
37	Gurba	1	0.13	98.63
38	Gurudi	1	0.13	98.76
39	Gurusingha	1	0.13	98.89
40	Kakada	1	0.13	99.02
41	Kakadaru	1	0.13	99.15
42	Kalachua	1	0.13	99.28
43	Kalasha	1	0.13	99.41
44	Kurum	1	0.13	99.54
45	Labah	1	0.13	99.67
46	Palash	1	0.13	99.80
47	Sekarai	1	0.13	99.93
	Total	**743**		

Table 4.9: Density of trees and % of representation, Revenue Forest, Karadapal.

Sl no.	**Tree sps**	**Density (per ha)**	**% of representation**	**Cumulative %**
1	Sal	564	83.68	83.68
2	Char	32	4.75	88.43
3	Jia	16	2.37	**90.80**
4	Mahul	12	1.78	92.58
5	Bhalia	10	1.48	94.07
6	Palash	8	1.19	95.25
7	Asan	6	0.89	96.14
8	Kashi	6	0.89	97.03
9	Kendu	4	0.59	97.63
10	Ame	2	0.30	97.92
11	Bahada	2	0.30	98.22
12	Dhaura	2	0.30	98.52
13	Gandhuli	2	0.30	98.82
14	Harida	2	0.30	99.12
15	Jaligachha	2	0.30	99.42
16	Kerhuan	2	0.30	99.72
17	Kumbhi	2	0.30	100.02

4.10: Density of tree species, Sal belt, Reserve Forest, Suruguda.

Sl no	Tree species	Density	Relative Density	Cumulative %
1	Sargi	414	63.89	63.89
2	Sahaj	93	14.35	78.24
3	Char	24	3.70	81.94
4	Kekat	20	3.09	85.03
5	Piasal	18	2.78	87.81
6	Bel	14	2.16	89.97
7	Bheruan	12	1.85	91.82
8	Bahada	11	1.70	93.52
9	Karla	5	0.77	94.29
10	Harida	4	0.62	94.91
11	Baldia	3	0.46	95.37
12	Tetlia	3	0.46	95.83
13	Bhelwan	2	0.31	96.14
14	Dhuben	2	0.31	96.45
15	Ghulli	2	0.31	96.76
16	Khair	2	0.31	97.07
17	Kumbhi	2	0.31	97.38
18	Mahul	2	0.31	97.69
19	Semel	2	0.31	97.99
20	Senha	2	0.31	98.30
21	Beni	1	0.15	98.46
22	Gamhari	1	0.15	98.61
23	Gutkharka	1	0.15	98.77
24	Kadam	1	0.15	98.92
25	Kantei	1	0.15	99.07
26	Karma	1	0.15	99.23
27	Kathel	1	0.15	99.38
28	Muid	1	0.15	99.54
29	Pippali	1	0.15	99.69
30	Sunari	1	0.15	99.85
31	Tharo	1	0.15	100.00
	Total	**648**	**100.00**	

4.11 ; Density of trees , Bamboo belt, Suruguda

Sl no	Tree species	Density (per ha)	Relative Density	Cumulative %
1	Karla	38	15.4471545	15.44715
2	Salhiya	22	8.94308943	24.39024
3	Dhuben	20	8.1300813	32.52033
4	Kendu	20	8.1300813	40.65041
5	Piasal	20	8.1300813	48.78049
6	Kekat	16	6.50406504	55.28455
7	Ganjher	14	5.69105691	60.97561
8	Asan	24	9.75609756	70.73171
9	Dhaula	12	4.87804878	75.60976
10	Baldia	10	4.06504065	79.67748
11	Bheruan	8	3.25203252	82.92683
12	Char	6	2.43902439	85.36585
13	Mai	6	2.43902439	87.80488

14	Senha	6	2.43902439	90.2439
15	Gamhari	4	1.62601626	91.86992
16	Kantei	4	1.62601626	93.49593
17	Muid	4	1.62601626	95.12195
18	Aanchi	2	0.81300813	95.93496
19	Bel	2	0.81300813	96.74797
20	Genduli	2	0.81300813	97.56098
21	Kusum	2	0.81300813	98.37398
22	Mundi	2	0.81300813	99.18699
23	Rahena	2	0.81300813	100
		246		

4.12 Density of trees, social forestry plantation, suruguda

	Tree sps.	Per ha	Rel Density	Cumulative %
1	Acacia	198	38.97637795	38.97637795
2	Chakunda	162	31.88976378	70.86614173
3	Radhachuda	70	13.77952756	84.64566929
4	Mahalimba	26	5.118110236	89.76377953
5	Sishu	18	3.543307087	93.30708661
6	Eucalyptus	16	3.149606299	96.45669291
7	Krushnachuda	8	1.57480315	98.03149606
8	Senha	4	0.787401575	98.81889764
9	Baragachha	2	0.393700787	99.21259843
10	Sal	2	0.393700787	99.60629921
11	Sirish	2	0.393700787	100
		508		

4.13 : Density of tree species, Baghamunda

	Tree sps	Density (per ha)	% of repsn	Cum %
1	Sal	153	48.11	48.11
2	Mai	41	12.89	61.01
3	Asan	19	5.97	66.98
4	Char	13	4.09	71.07
5	Kendu	12	3.77	74.84
6	Dhaura	11	3.46	78.30
7	Ganjhiari	10	3.14	81.45
8	Mahul	10	3.14	84.59
9	Bheru	6	1.89	86.48
10	Dhubuni	6	1.89	88.36
11	Damghurdi	4	1.26	89.62
12	Kusum	4	1.26	90.88
13	Paladhua	4	1.26	92.14
14	Bahada	3	0.94	93.08
15	Karada	3	0.94	94.03
16	Anchhu	2	0.63	94.65
17	Bhuinkeruhan	2	0.63	95.28
18	Girdhini	2	0.63	95.91
19	Kalikendu	2	0.63	96.54
20	Kurdungi	2	0.63	97.17
21	Salhei (salhen)	2	0.63	97.80
22	Simuli	2	0.63	98.43
23	Sishu	2	0.63	99.06

24	Bhalia	1	0.31	99.37
25	Bija	1	0.31	99.69
26	Sidha	1	0.31	100.00
	Total	**318**	**100.00**	

4.14: Density of trees, Talbahali Forest, Talbahali

	Tree species	Dentity (per ha)	% of representation	Cumulative %
1	Sal	734	69.18001885	69.18001885
2	Dhaula	60	5.655042413	74.83506126
3	Char	47	4.429783223	79.26484449
4	Asan	25	2.356267672	81.62111216
5	Mahul	24	2.262016965	83.88312912
6	Kalam	19	1.790763431	85.67389255
7	Kendu	14	1.319509896	86.99340245
8	Bada gilari	11	1.036757776	88.03016023
9	Bhalia	10	0.942507069	88.9726673
10	Achhu	9	0.848256362	89.82092366
11	Gamhari	8	0.754005655	90.57492931
12	Kashi	7	0.659754948	91.23468426
13	Anla	6	0.565504241	91.8001885
14	Chauli	6	0.565504241	92.36569274
15	Dhubuni	6	0.565504241	92.93119698
16	Harida	6	0.565504241	93.49670123
17	Jamu	6	0.565504241	94.06220547
18	Khasi	6	0.565504241	94.62770971
19	Phenphena	6	0.565504241	95.19321395
20	Bija	5	0.471253534	95.66446748
21	Dhamuni	4	0.377002828	96.04147031
22	Katha siali	4	0.377002828	96.41847314
23	Khurdu	4	0.377002828	96.79547597
24	Tilau	4	0.377002828	97.17247879
25	Bainku	3	0.282752121	97.45523091
26	Geda	3	0.282752121	97.73798303
27	Khais	3	0.282752121	98.02073516
28	Tentala	3	0.282752121	98.30348728
29	Basang	2	0.188501414	98.49198869
30	Chuleigudi	2	0.188501414	98.6804901
31	Girdhini	2	0.188501414	98.86899152
32	Kantagachha	2	0.188501414	99.05749293
33	Matha	2	0.188501414	99.24599434
34	Bahada	1	0.094250707	99.34024505
35	Bandan	1	0.094250707	99.43449576
36	Banpalasha	1	0.094250707	99.52874647
37	Daka	1	0.094250707	99.62299717
38	Kukudahadi	1	0.094250707	99.71724788
39	Kusum	1	0.094250707	99.81149859
40	Lakdakana	1	0.094250707	99.90574929
41	Simili	1	0.094250707	100
	Total	**1061**	**100**	

Chart 1 : Size class distribution of trees, Belabani, Gadabanikilo

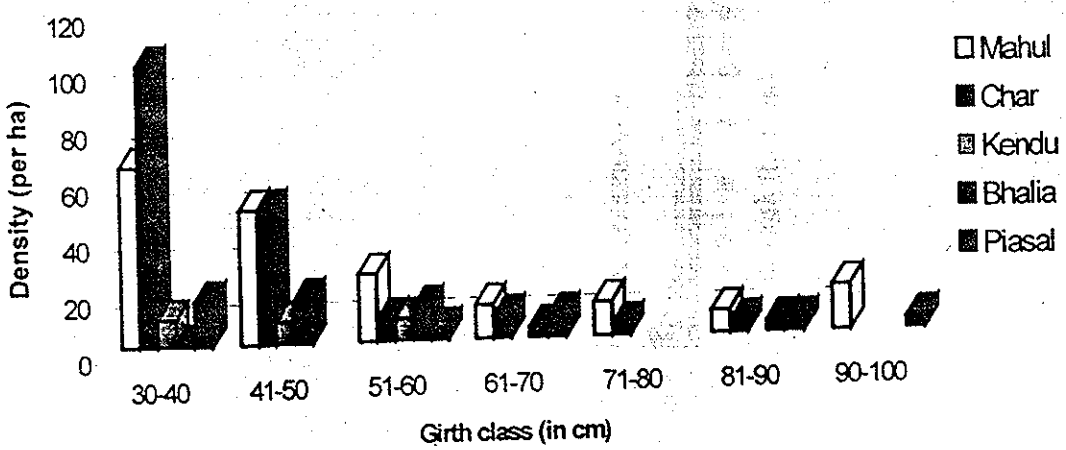


Chart 2 : Size class distribution of trees, Godabandha.

Chart 3 : Size class distribution of trees, Mahulabani

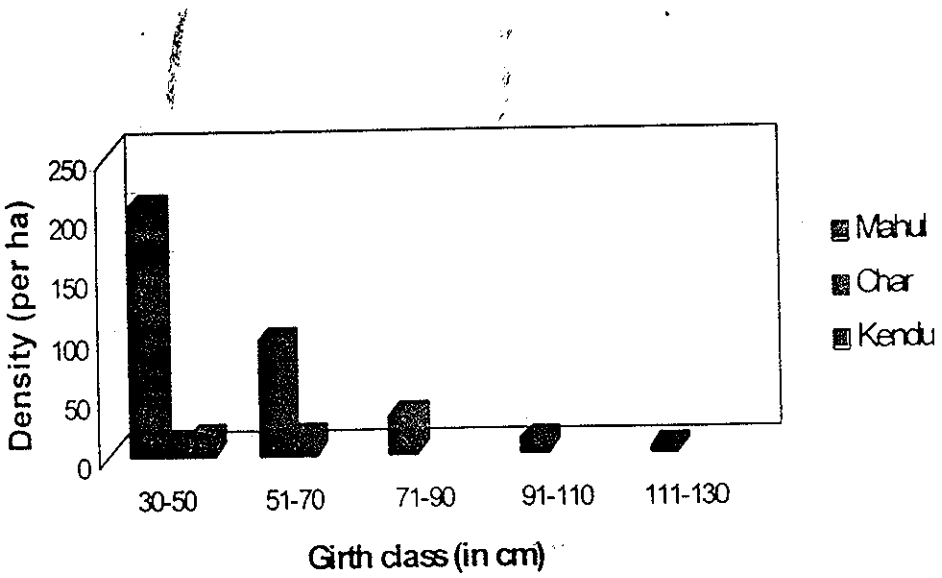


Chart 4 : Size class distribution of trees, Padar.

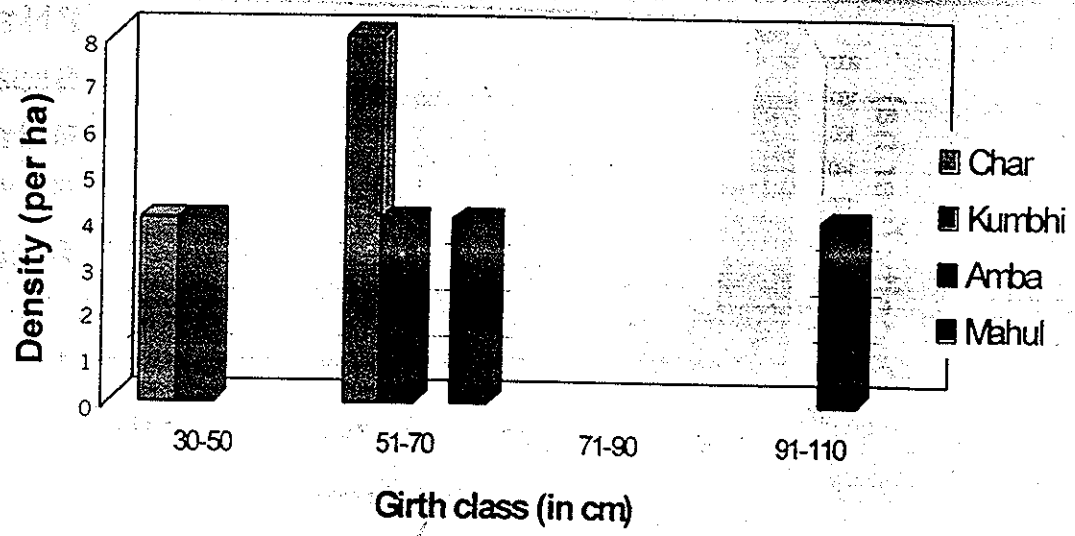


Chart 5: Size class distribution of trees, Gochar

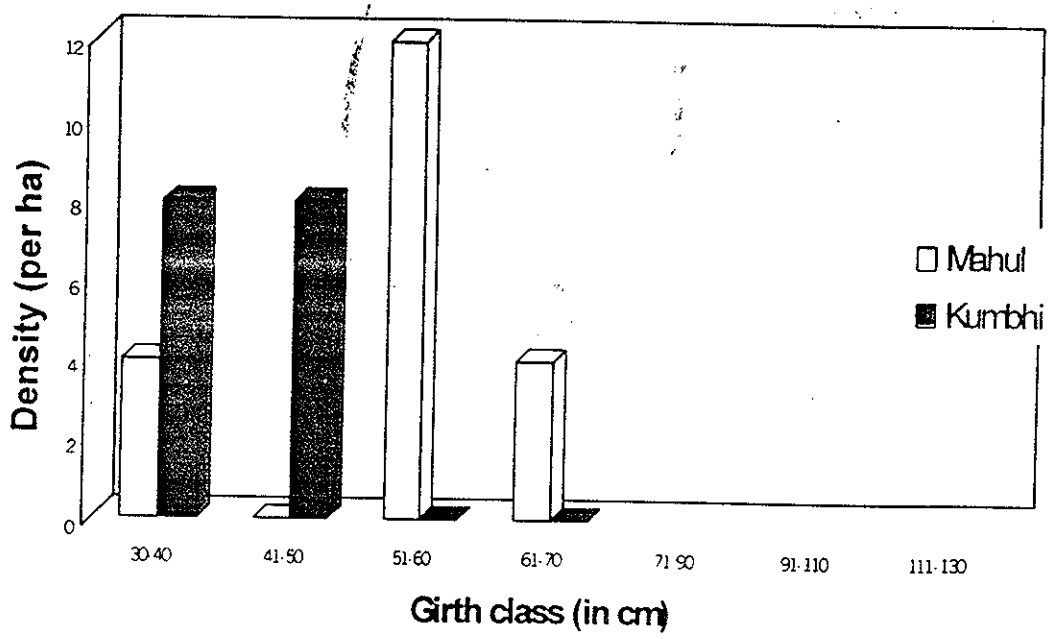


Chart 6: Size class distribution of trees, Uncleaned patch.

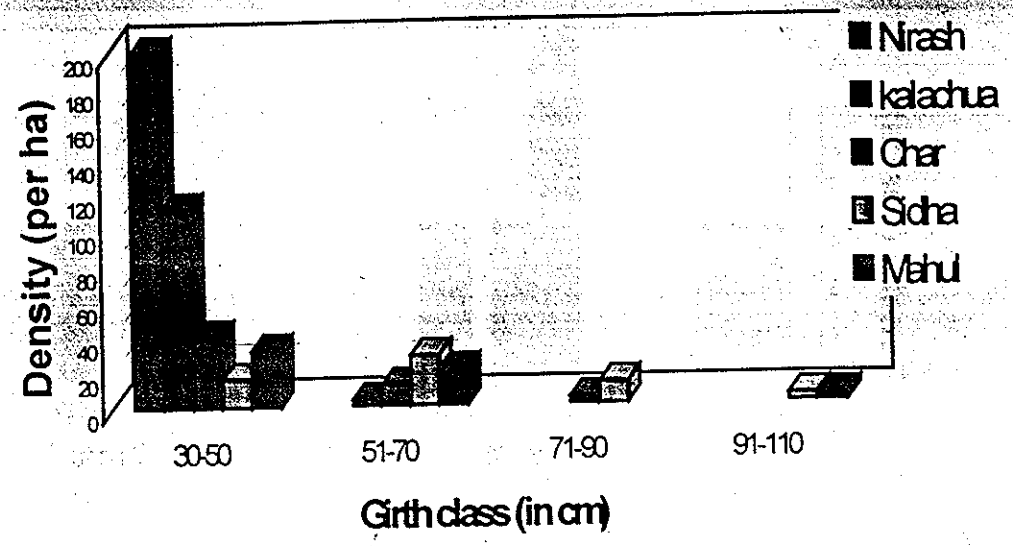


Chart 7 : Size class distribution of trees, Mahuladunga,RF

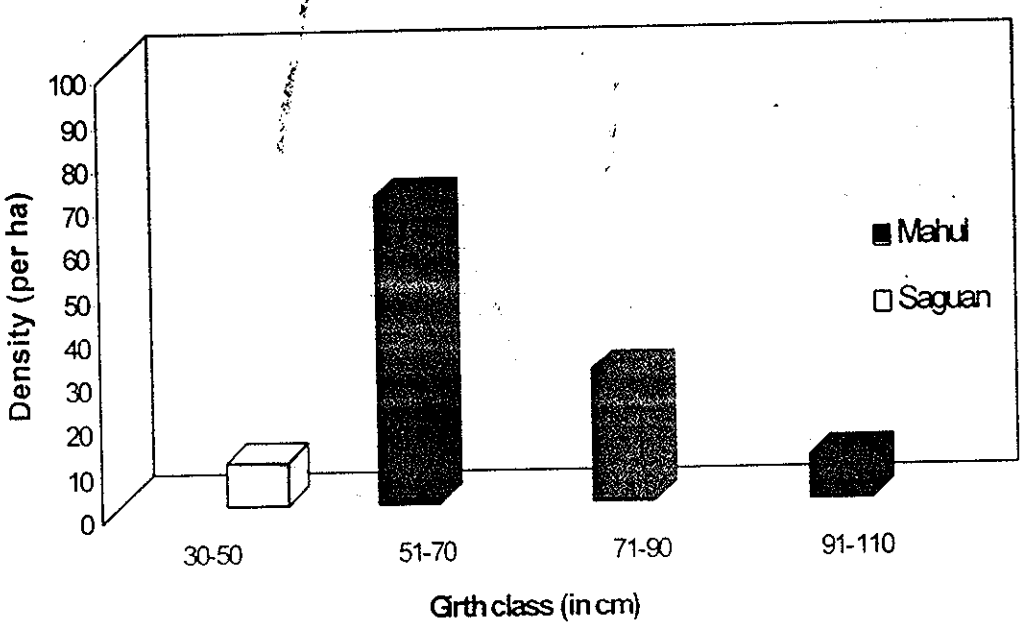


Chart 8: Size class distribution of trees, RF, Karadapal

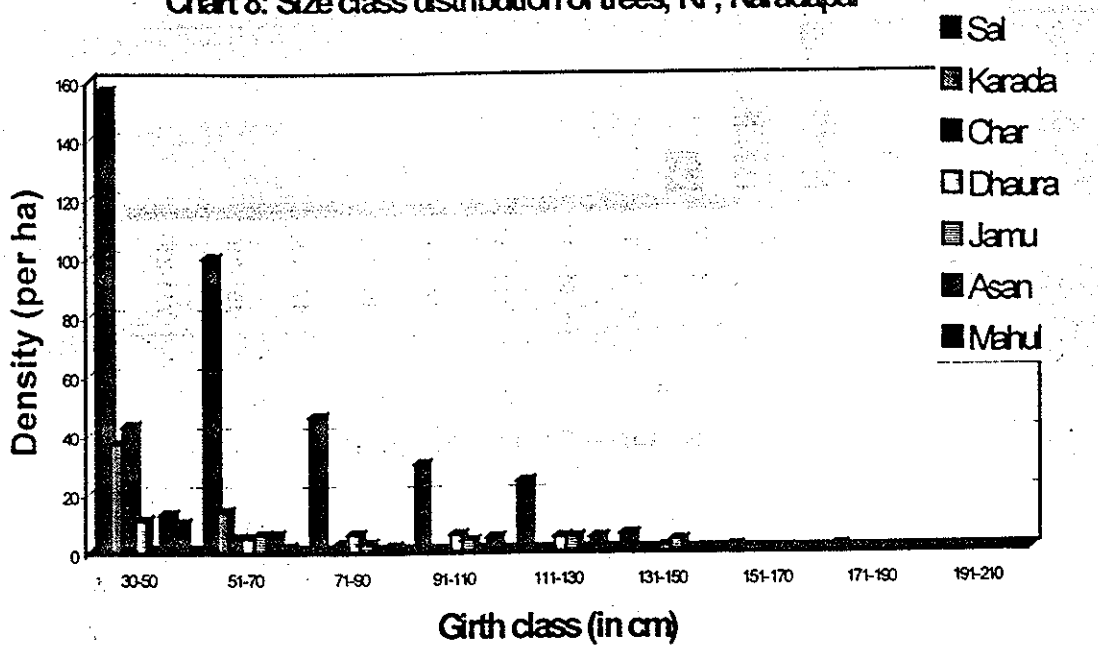


Chart 9 : Size class distribution of trees, Revenue Forest, Karadapal

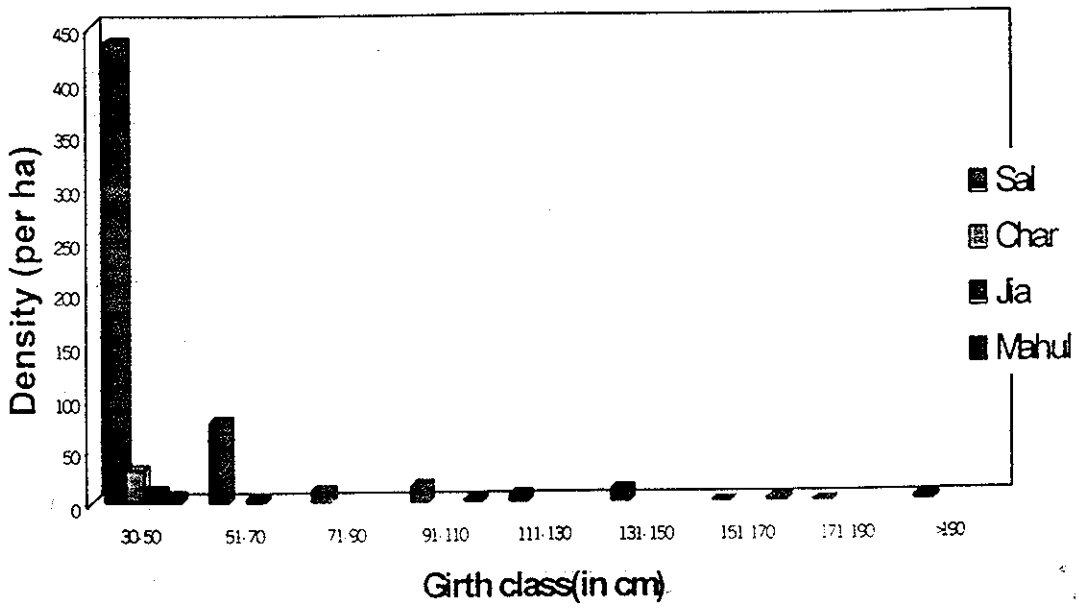


Chart 10: Size class distribution of Sal (Shorea robusta), Sal Belt, Reserve Forest, Suruguda

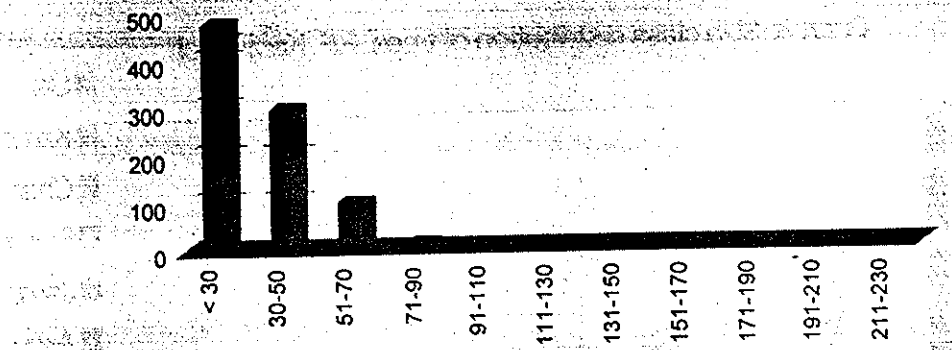


Chart 11: Size class distribution of Sahaj (Terminalia tomentosa), Reserve Forest, Suruguda.

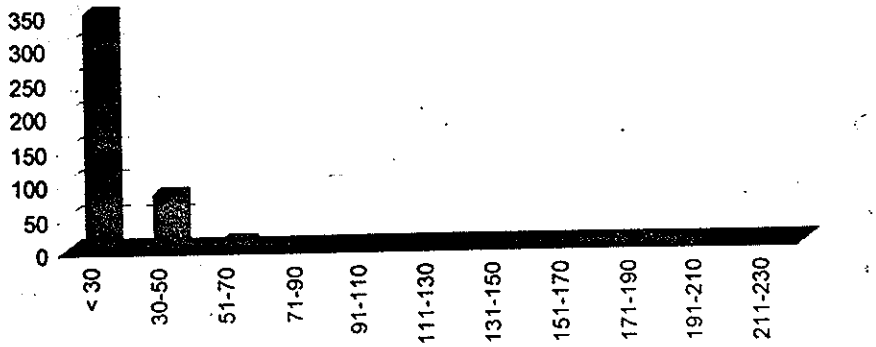


Chart 12: Size class distribution of Char (Buchanania lanzan), Reserve Forest, Suruguda.

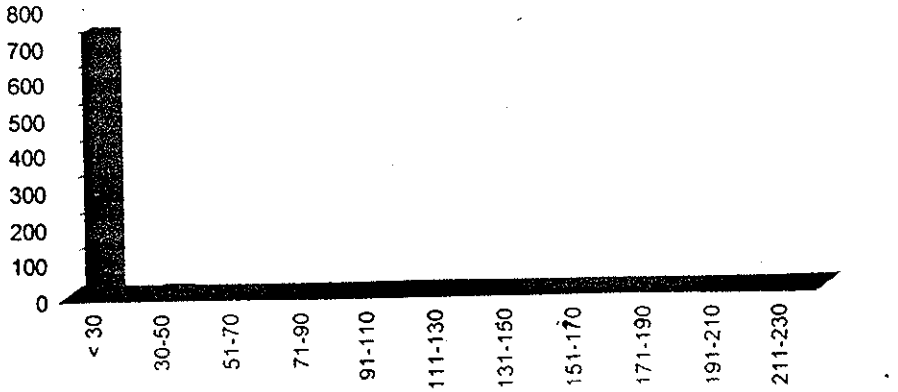


Chart 13: Size class distribution of Kekat, Reserve Forest, Suruguda.

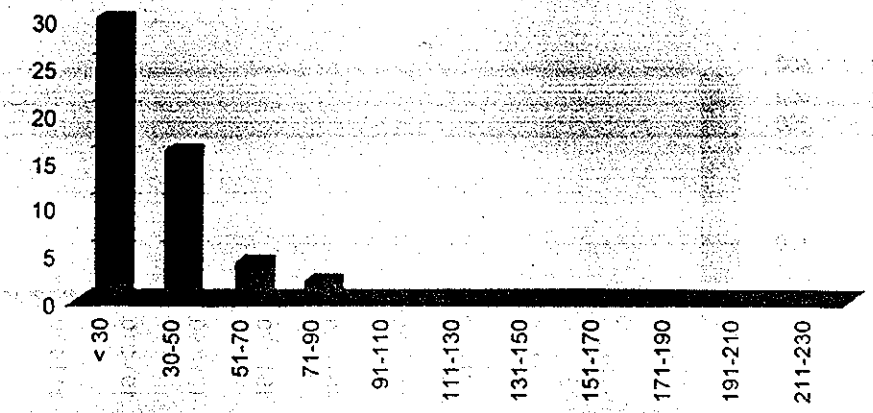


Chart 14: Size class distribution of Piasal (Pterocarpus marsupium), Reserve Forest, Suruguda.

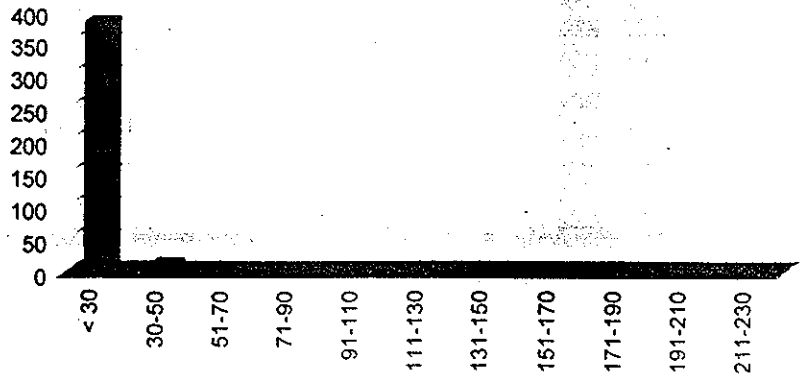


Chart 15: Size class distribution of Bel (Aegle marmelos), Reserve Forest, Suruguda

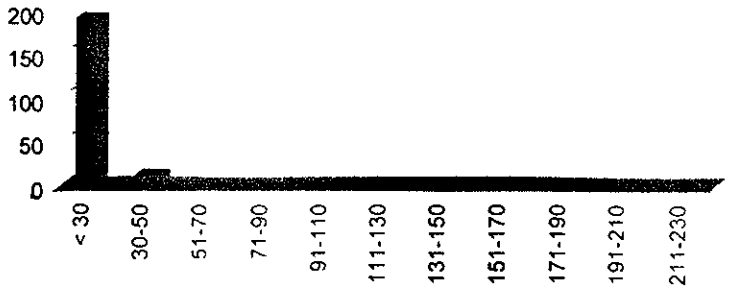


Chart 16: Size class distribution of Bheruan, Reserve Forest, Suruguda.

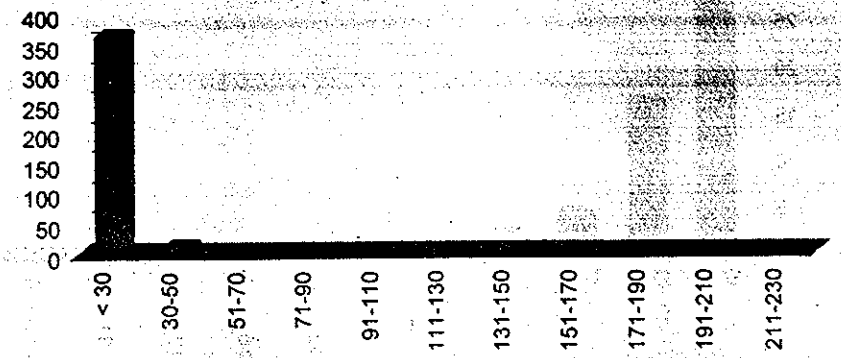


Chart 17: Size class distribution of Bahada (Terminalia belerica), Reserve Forest, Suruguda.

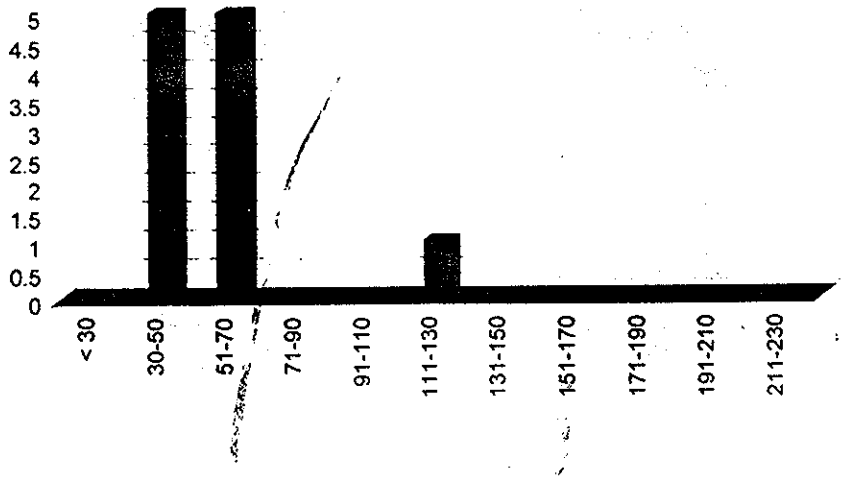


Chart 18: Size class distribution of Karla, Reserve Forest, Suruguda.

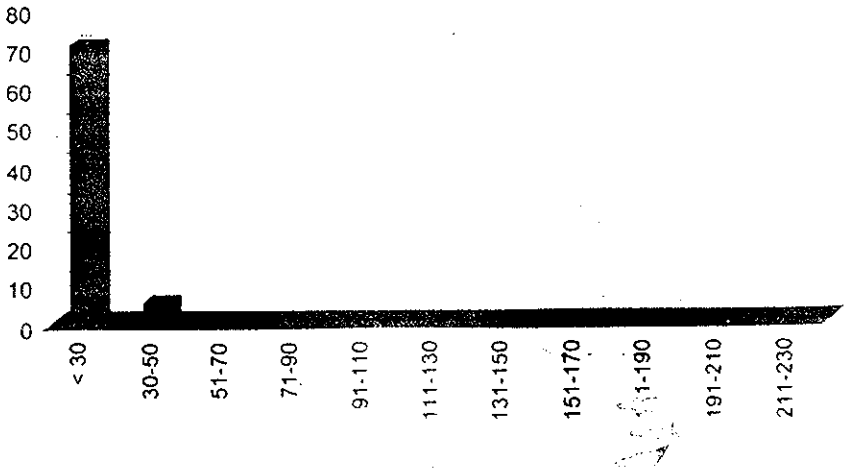


Chart 19: Size class distribution of Harida (Terminalia chebula), Reserve Forest, Suruguda.

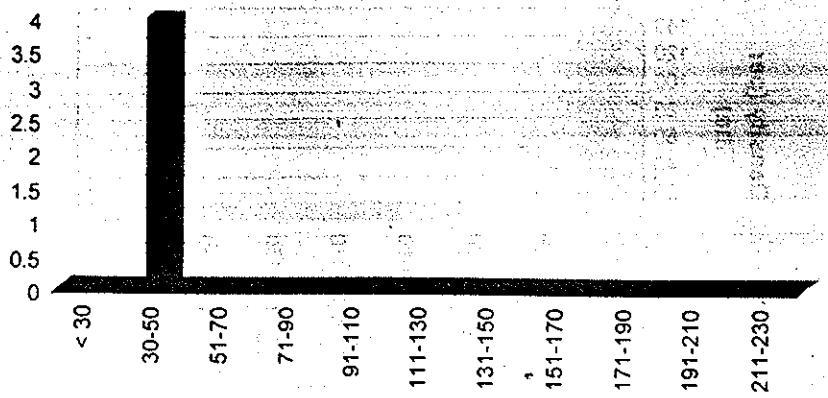


Chart 20 : Size class distribution of karla, Reserve Forest, Bindhapahar, Bamboo belt, Suruguda

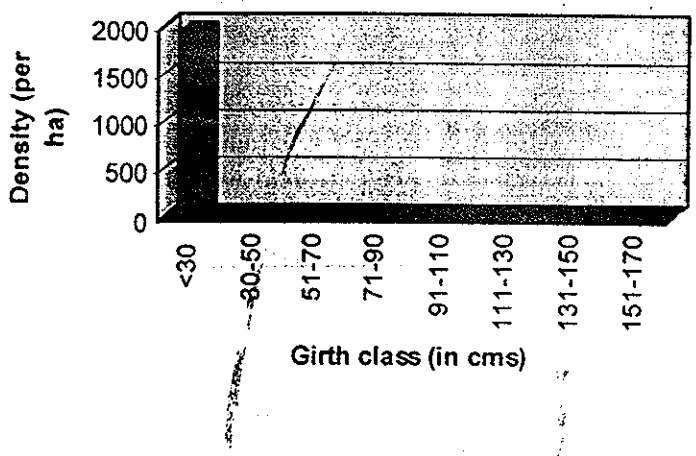


Chart 21: Size class distribution of salhiya, Reserve Forest, Bamboo belt, Suruguda.

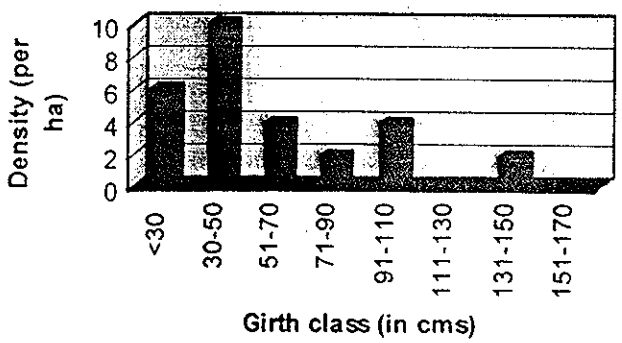


Chart 22: Size class distribution of Dhuben, Reserve Forest, Bamboo belt,Suruguda

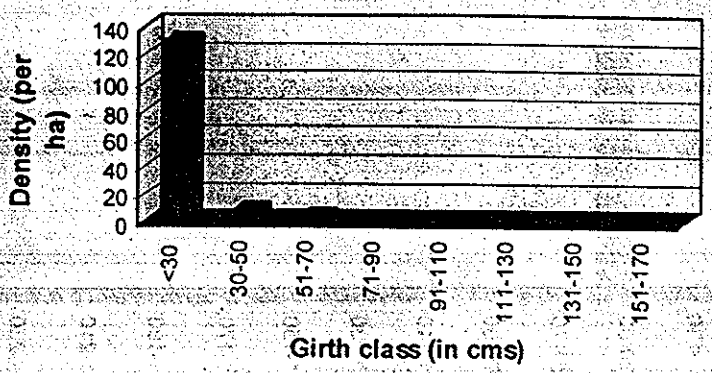


Chart 23: Size class distribution of Kendu, Reserve Forest, Bamboo belt,Suruguda.

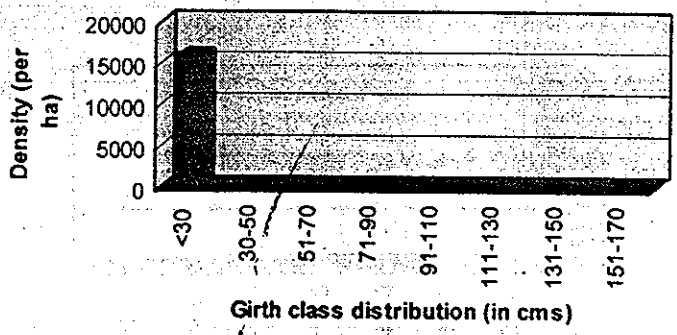


Chart 24: Size class distribution of Piasal (Pterocarpus marsupium), Reserve Forest, Bamboo belt,Suruguda.

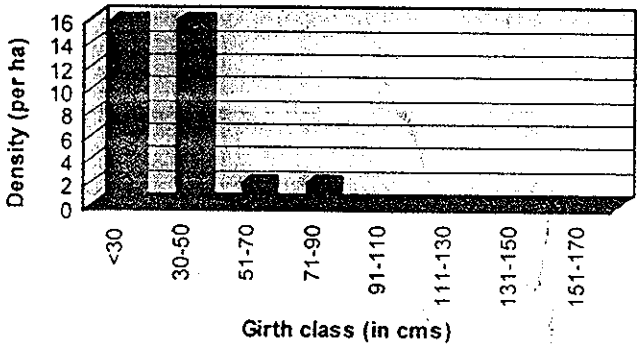


Chart 25: Size class distribution of Kekat, Reserve Forest, Bamboo belt, Suruguda

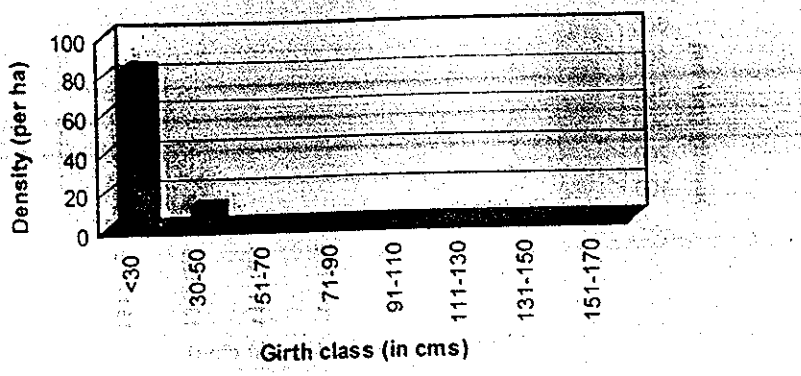


Chart 26: Size class distribution of Ganjher, Reserve Forest, Bamboo belt,Suruguda

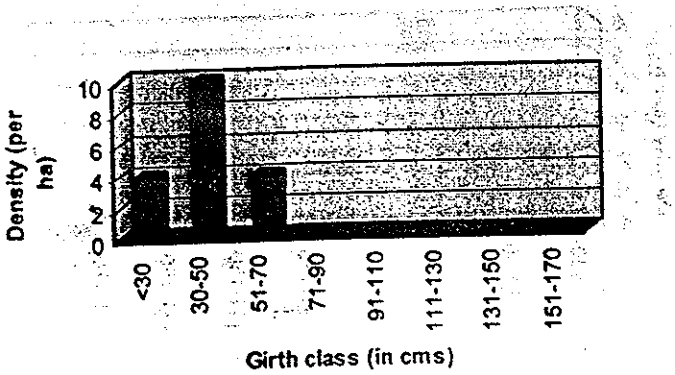


Chart 27: Size class distributionof Asan (Terminalia tomentosa), Reserve Forest, Bamboo belt,Suruguda

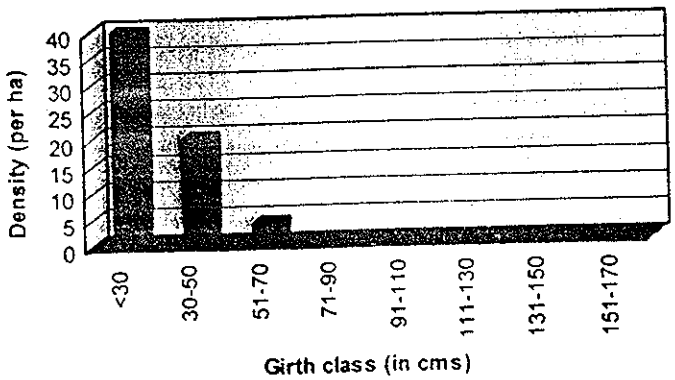


Chart 28: Size class distribution of Dhaula, Reserve Forest, Bamboo belt,Suruguda

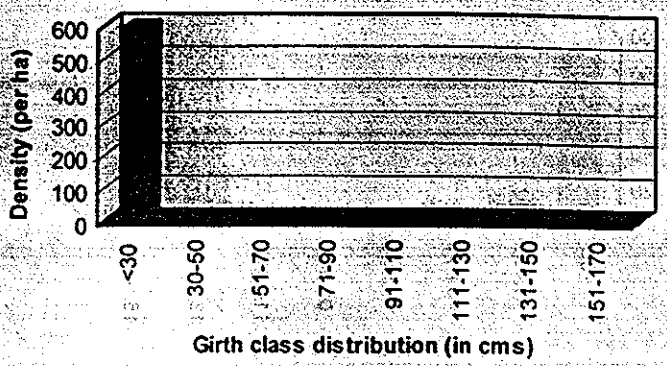


Chart 29: Size class distribution of Baldia, Reserve Forest, Bamboo belt,Suruguda.

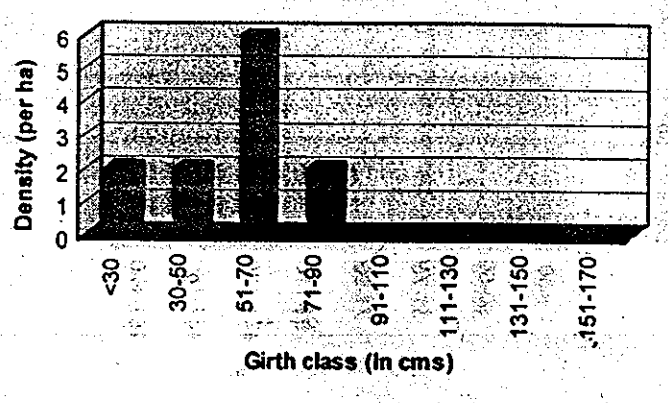


Chart 30: Size class distribution of tree species, social forestry plantions, suruguda.

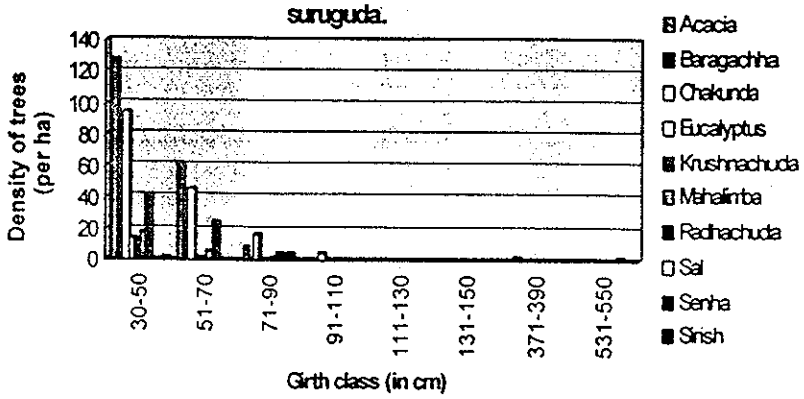


Chart 31: Size class distribution of sal, Baghamunda

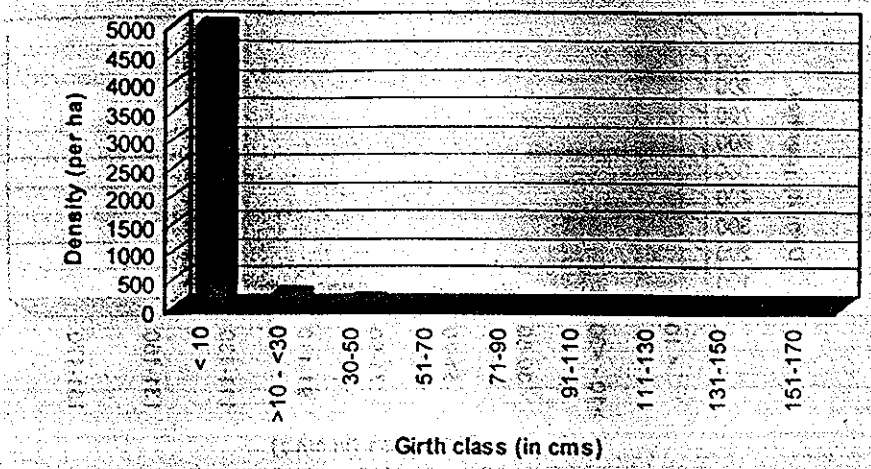


Chart 32: Size class distribution of Mai, Baghamunda

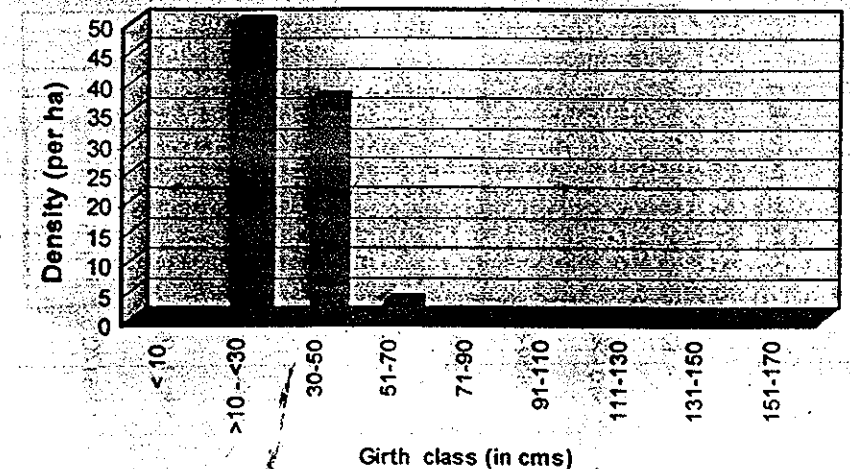


Chart 33: Size class distribution of Asan, Baghamunda

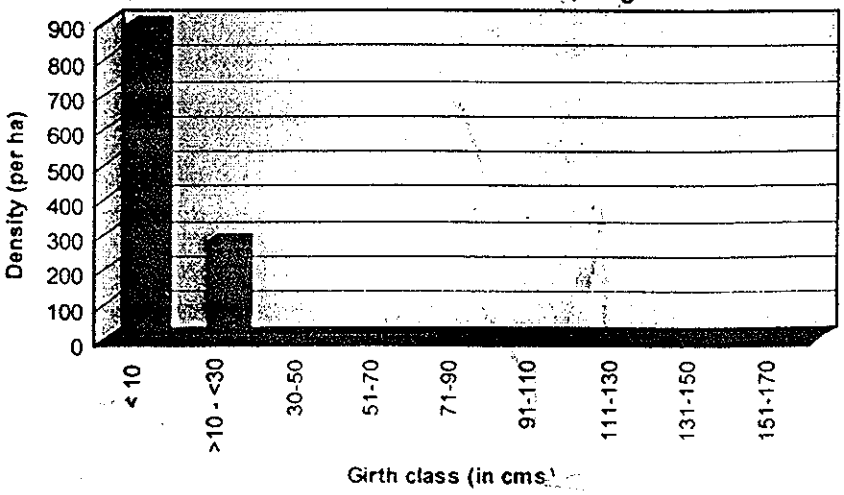


Chart 34: Size class distribution of Char,Baghamunda

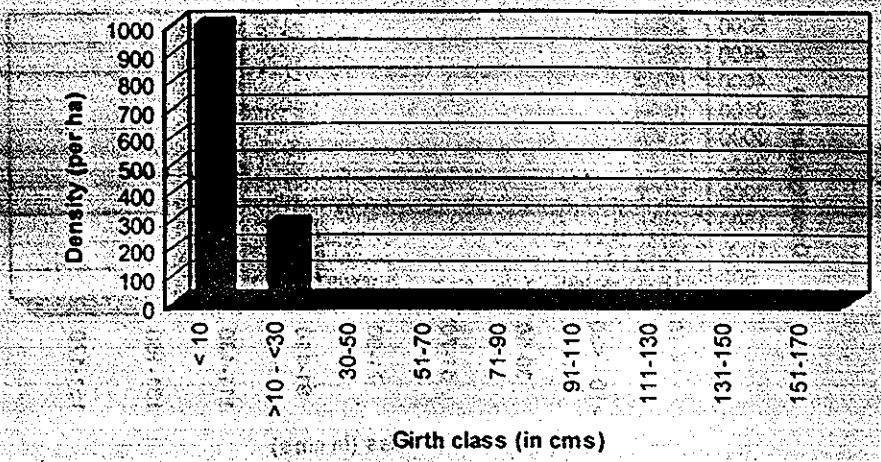


Chart 35: Size class distribution of Kendu, Baghamunda

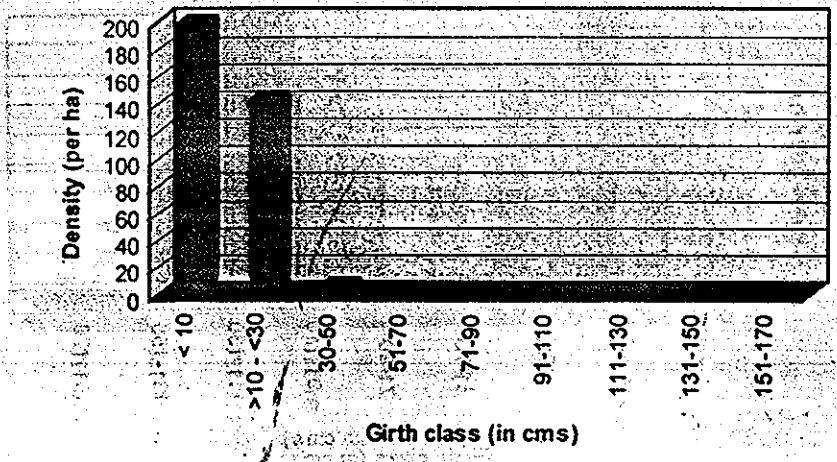


Chart 36: Size class distribution of Dhaura, Baghamunda

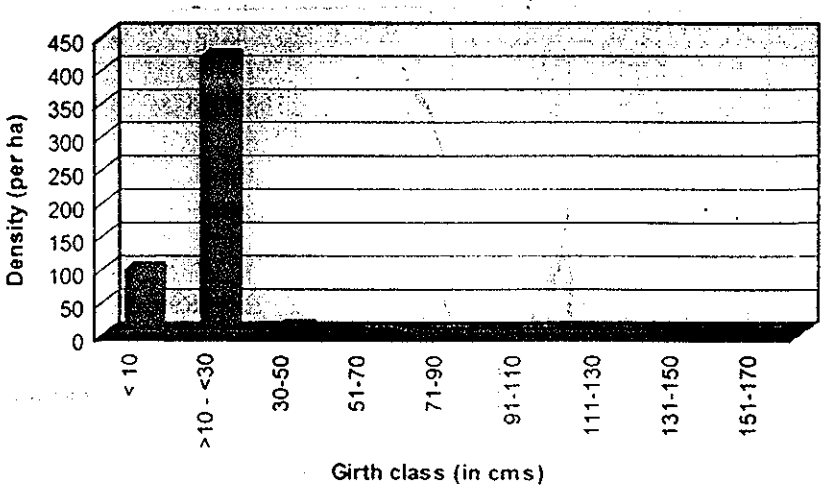


Chart 37: Size class distribution of Ganjhiari,Baghamunda

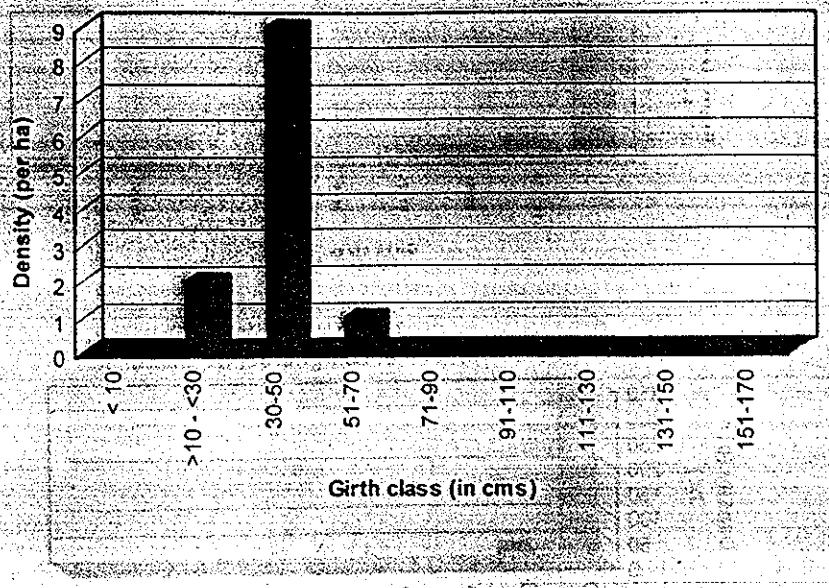


Chart 38: Size class distribution of Mahul,Baghamunda

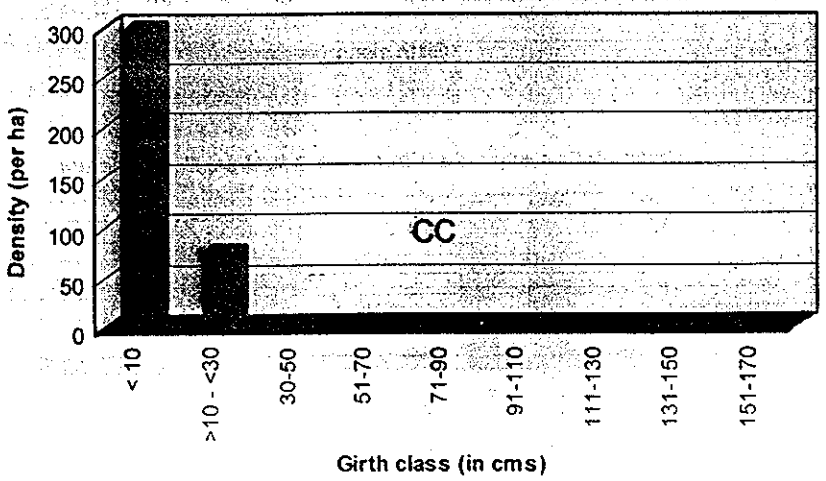


Chart 39: Size class distribution of Bheru, Baghamunda

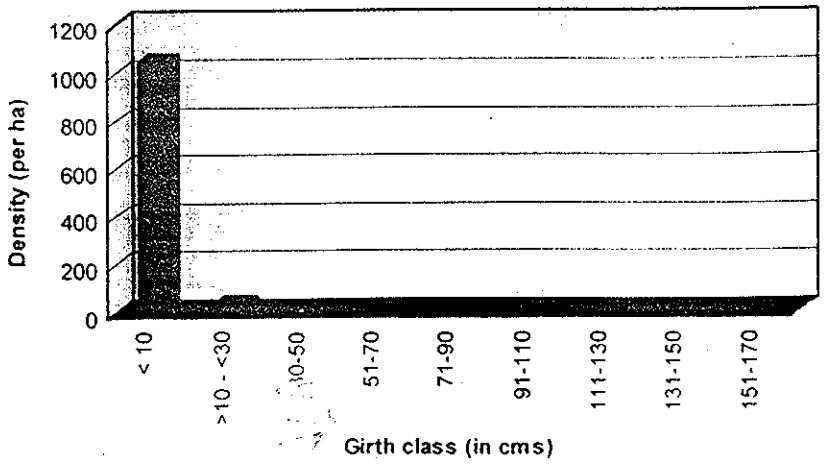


Chart: 40: Size class distribution of Dhubuni, Baghamunda

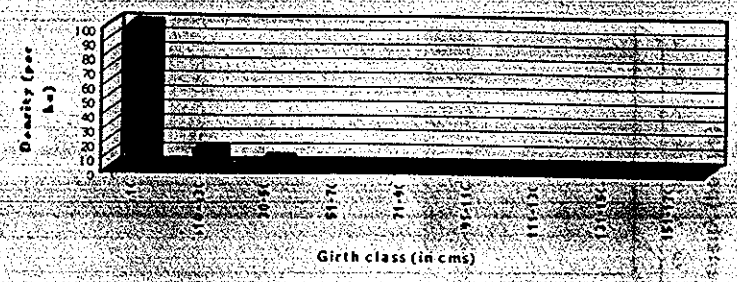


Chart 41: Size class distribution of Damghurdu, Baghamunda

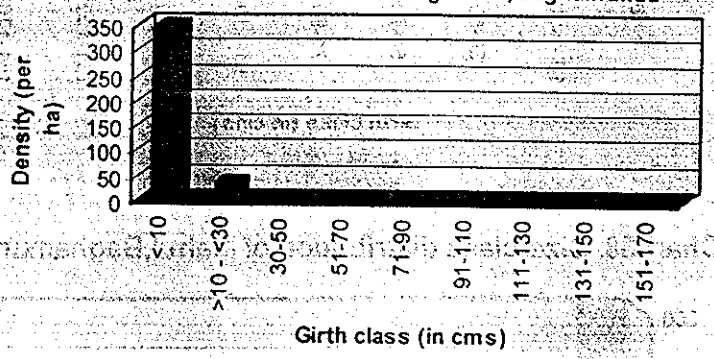


Chart 42: Size class distribution of Paladhua, Baghamunda

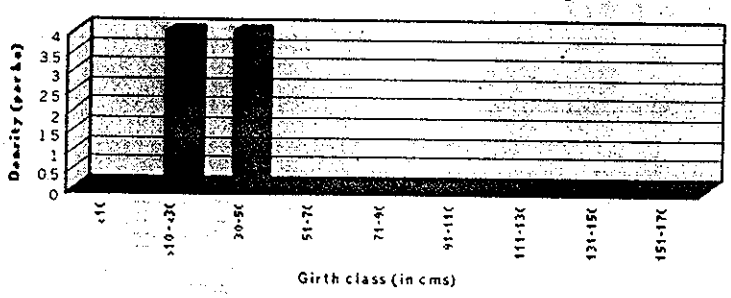


Chart 43: Size class distribution of Bahada, Baghamunda

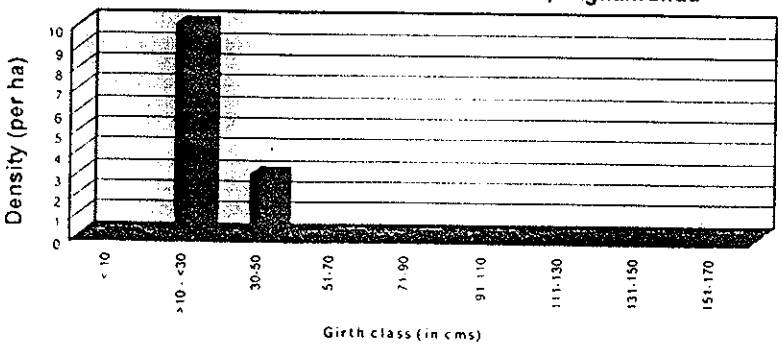


Chart 44: Size class distribution of Karada, Baghamunda

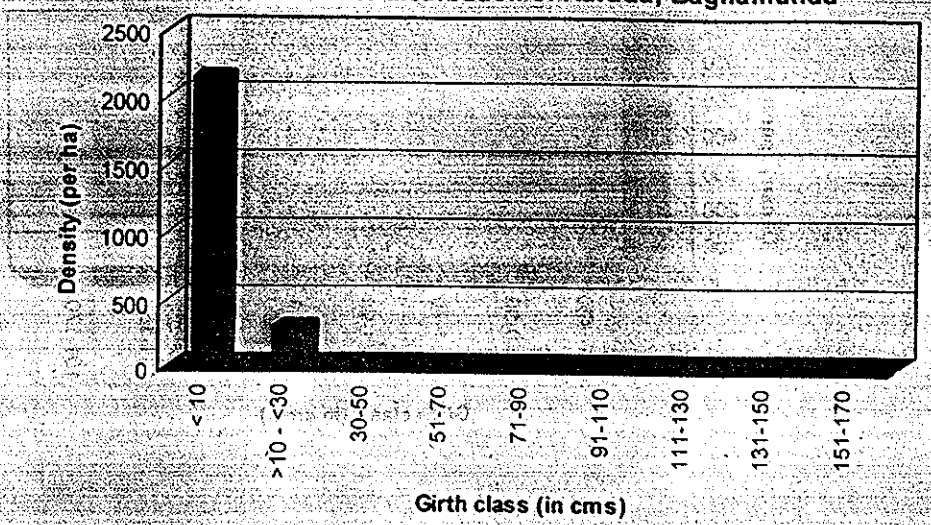


Chart 45: Size class distribution of Kusum, Baghamunda

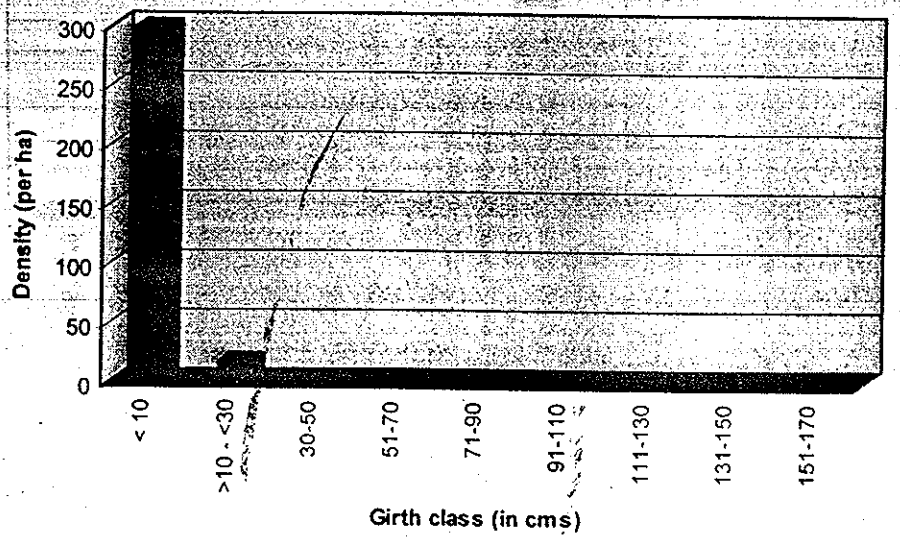


Chart 46: Size class distribution of Anchhu, Baghamunda

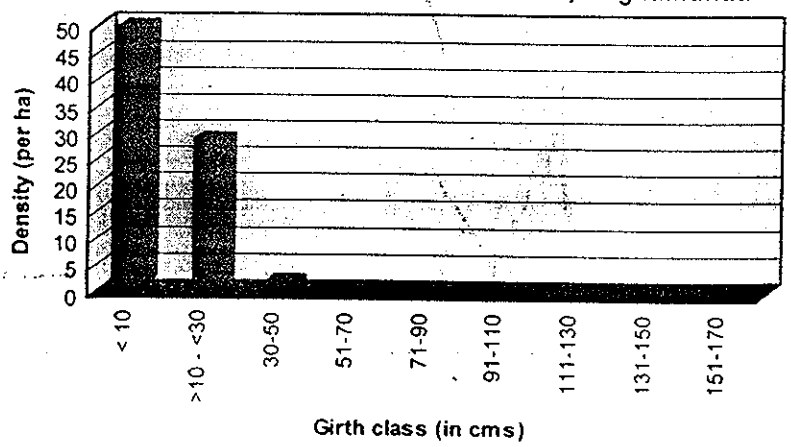


Chart 47: Size class distribution of Bhuinkeruhan, Baghamunda

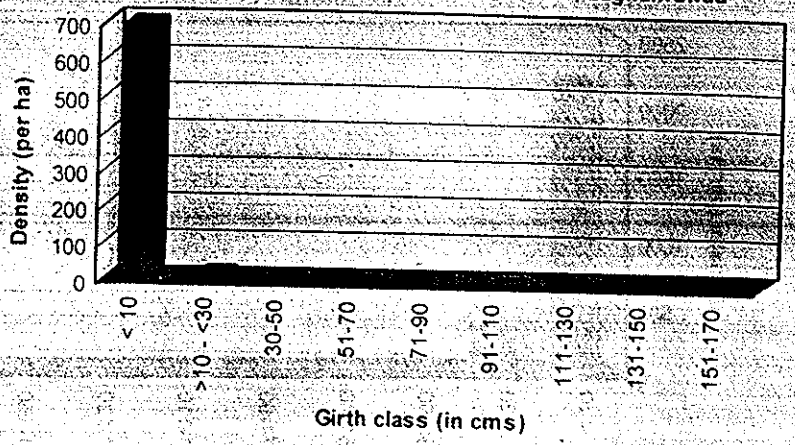


Chart 48: Size class distribution of Girdhini, Baghamunda

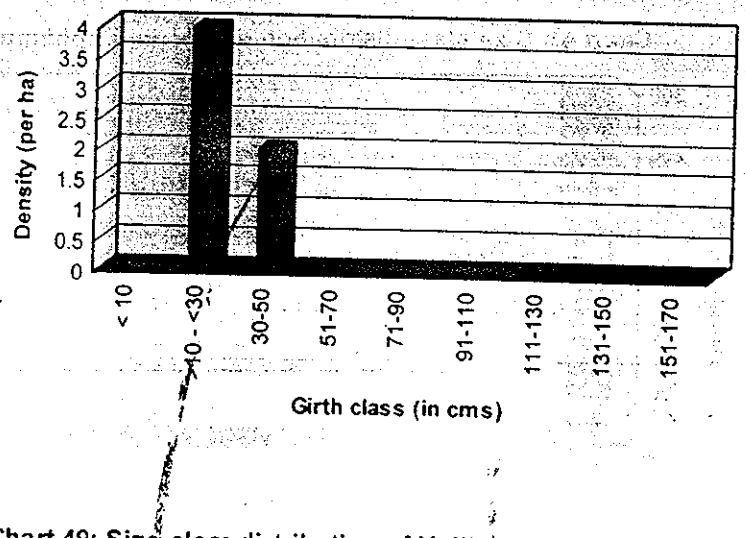


Chart 49: Size class distribution of Kalikendu, Baghamunda

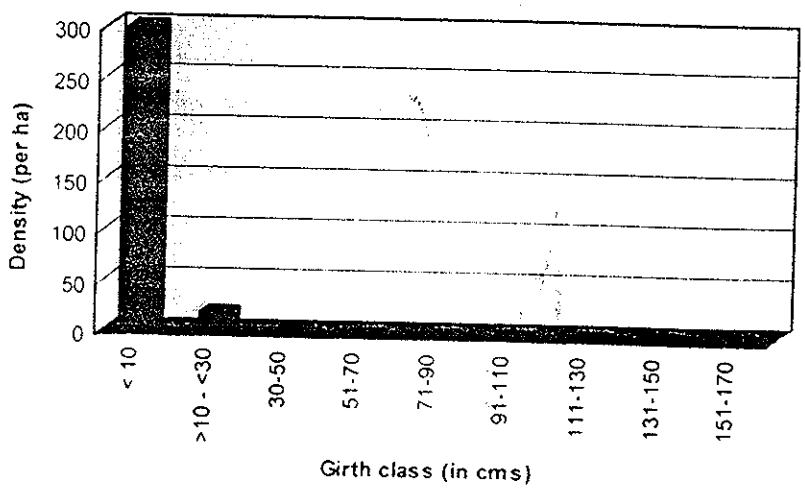


Chart 50: Size class distribution of Kurdungi, Baghamunda

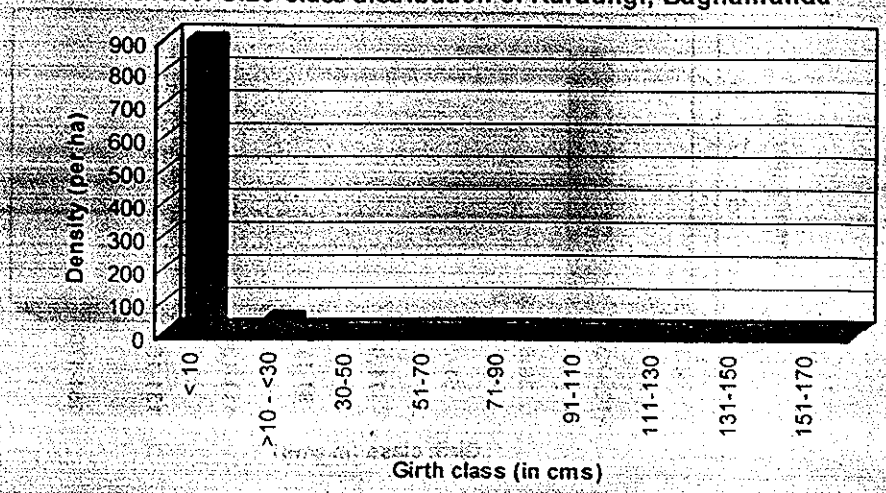


Chart 51: Size class distribution of Salhei (salhen)

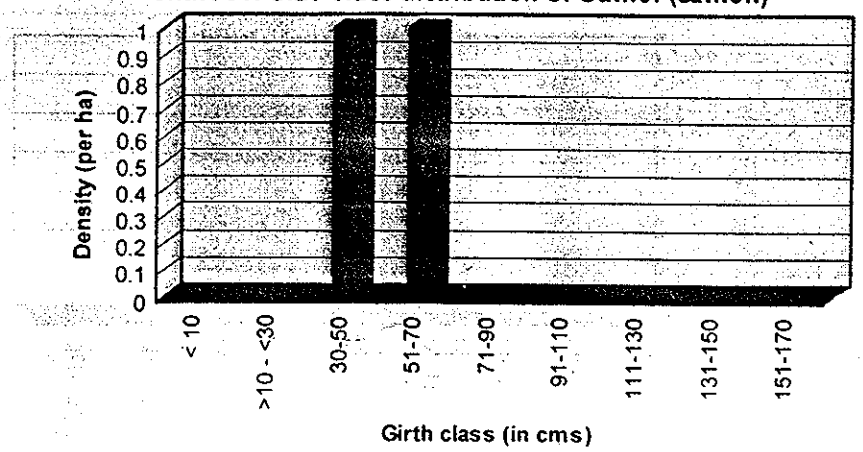


Chart 52: Size class distribution of Simuli, Baghamunda

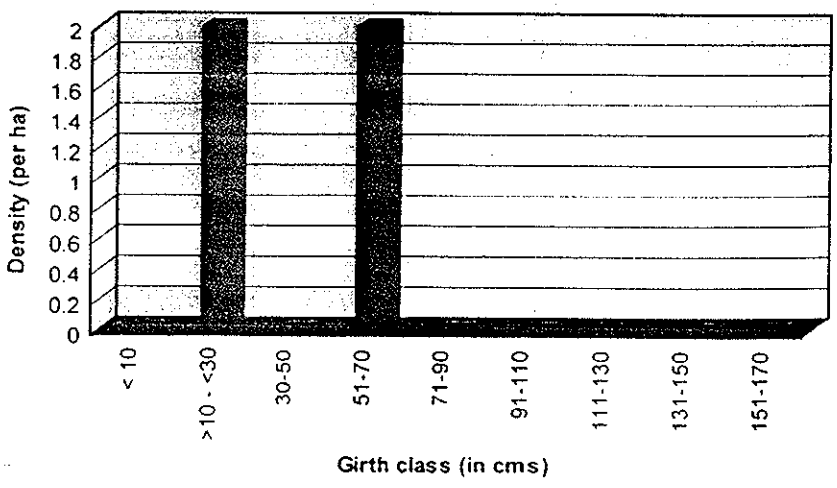


Chart 53: Size class distribution of Sishu, Baghamunda

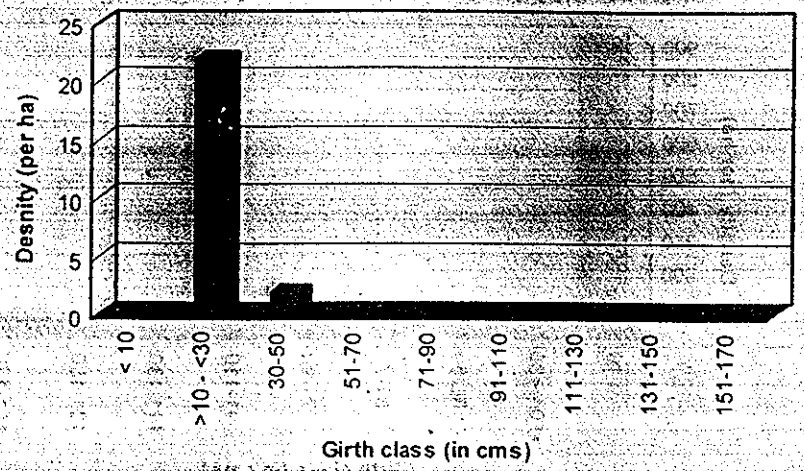


Chart 54: Size class distribution of Bhalia, Baghamunda

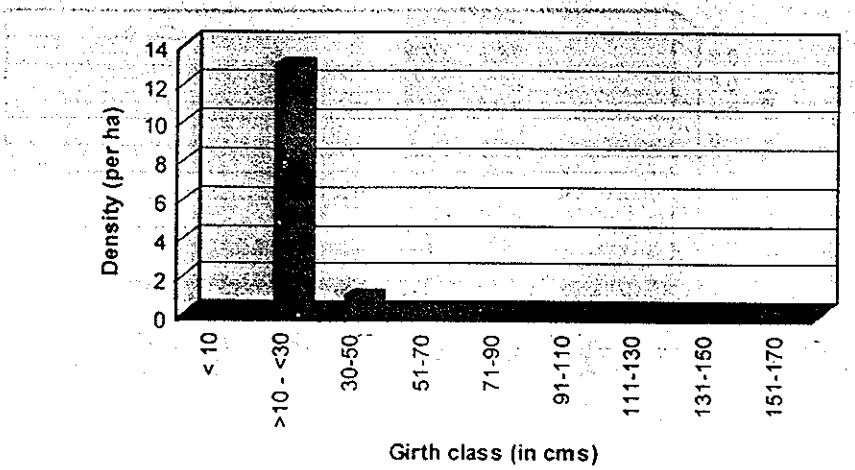


Chart 55: Size class distribution of Bija, Baghamunda

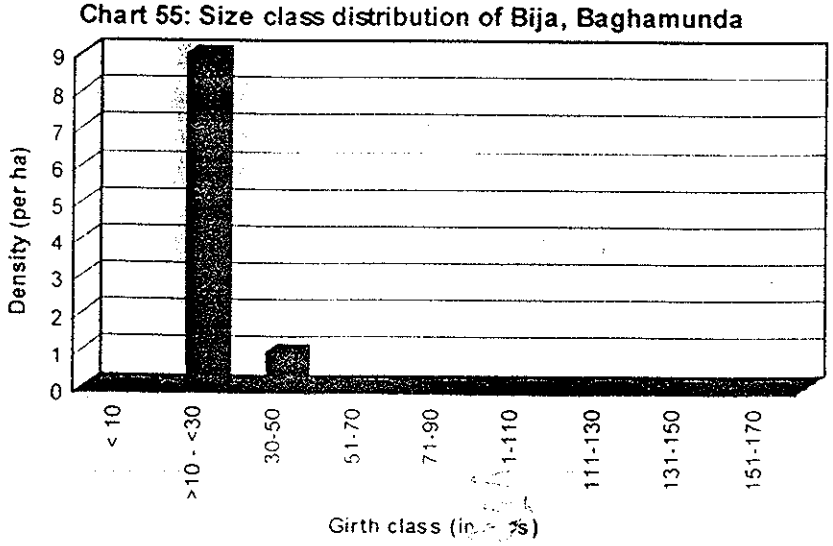
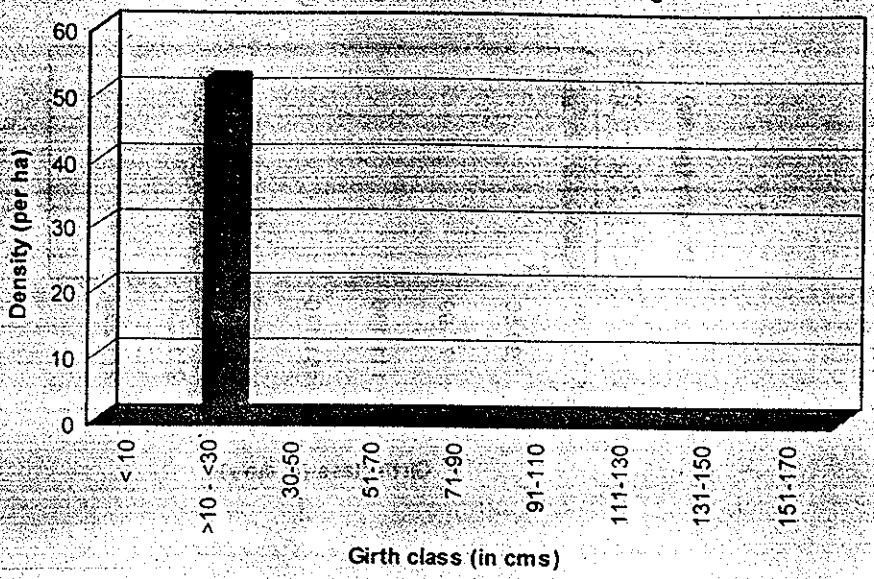


Chart 56: Size class distribution of Sidha, Baghamunda



Size class distribution of trees, Talbahali, uncultivated forest

Chart 57: Size class distribution of Achhu, Talbahali forest

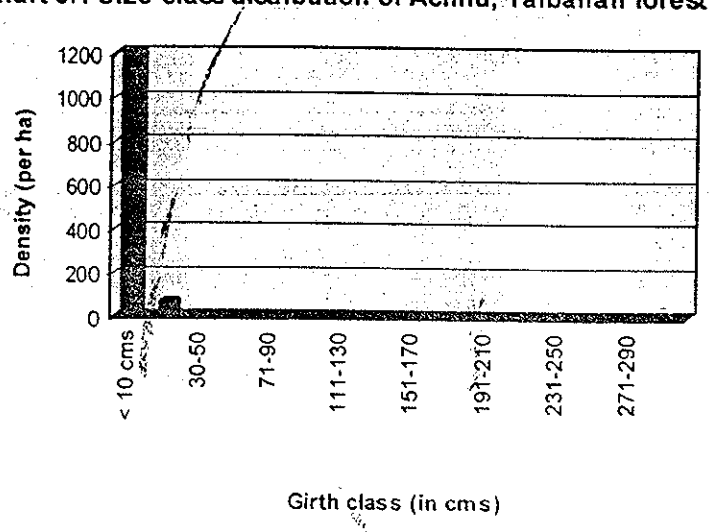


Chart 58: Size class distribution of Anla, Talbahali forest

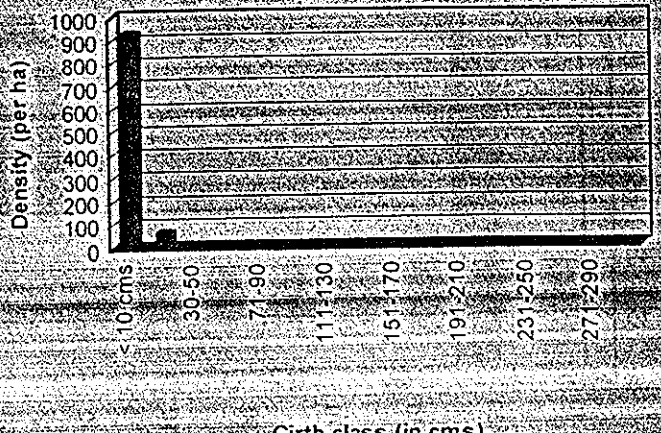


Chart 59: Size class distribution of Asan, Talbahali forest

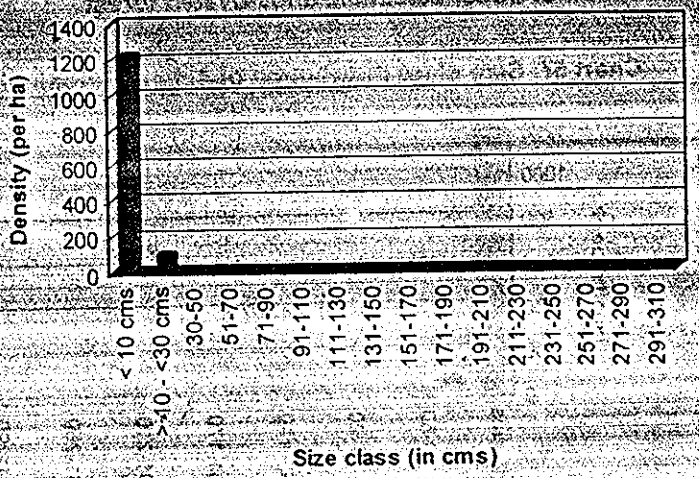


Chart 60: Size class distribution of Bada gilari, Talbahali forest

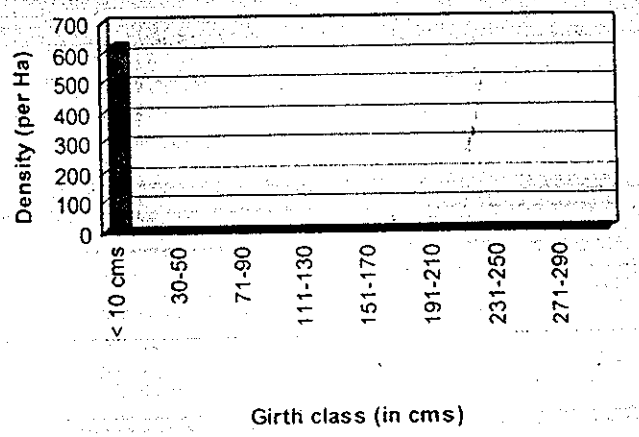


Chart 61: Size class distribution of Bahada, Talbahali forest

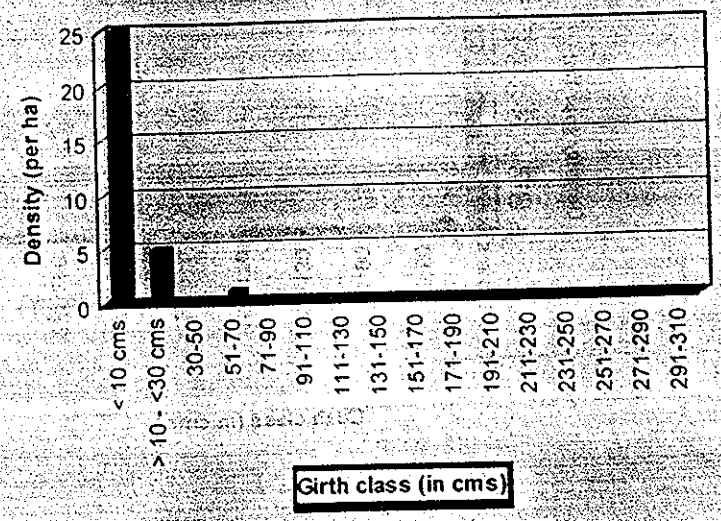


Chart 62: Size class distribution of Bainku, Talbahali forest

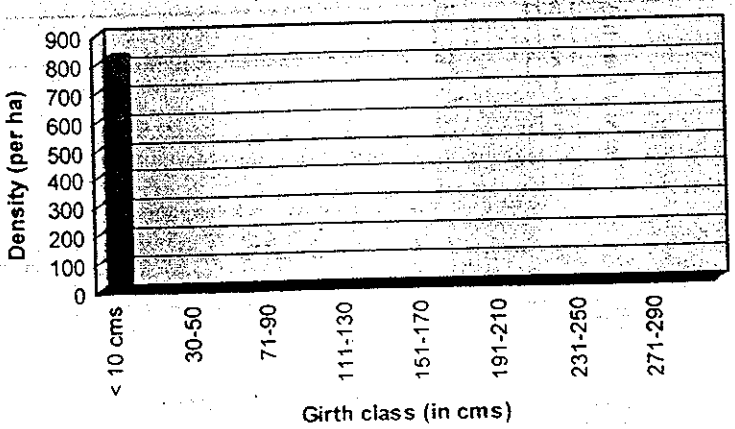


Chart 63: Size class distribution Bandan, Talbahali forest

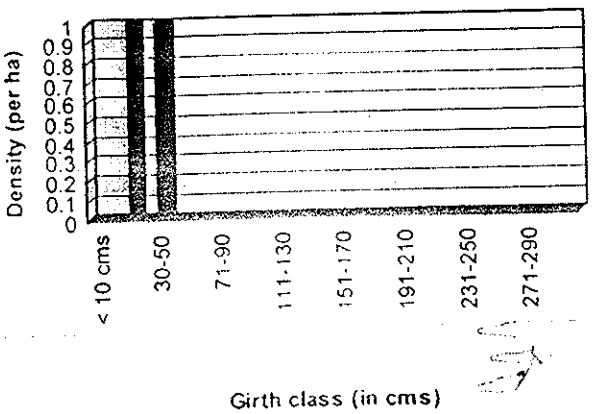


Chart 64: Size class distribution of Banpalasha, Talbahali forest

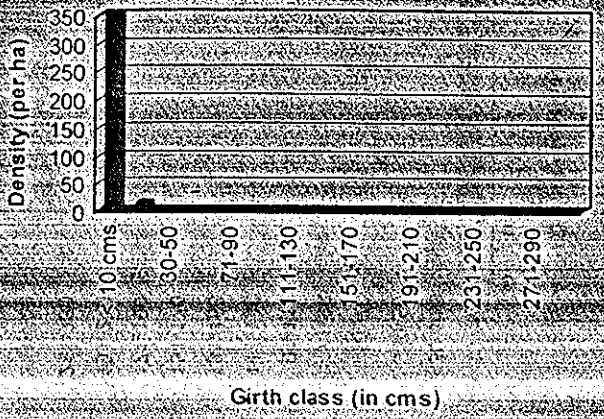


Chart 65: Size class distribution of Basang, Talbahali forest

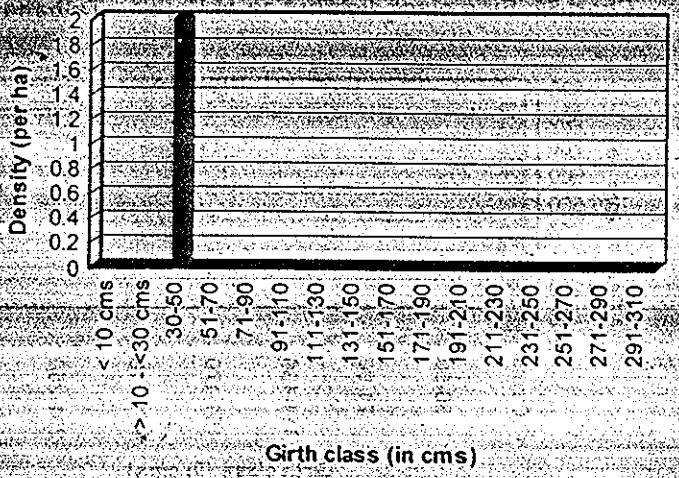


Chart 66: Size class distribution of Bhalia,Talbahali forest

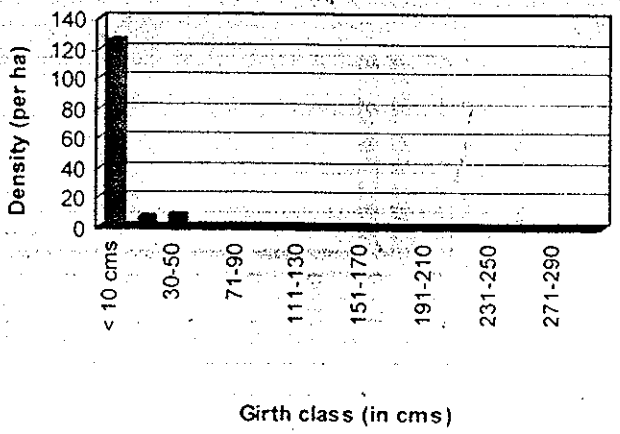


Chart 67: Size class distribution of Bija, Talbahali forest

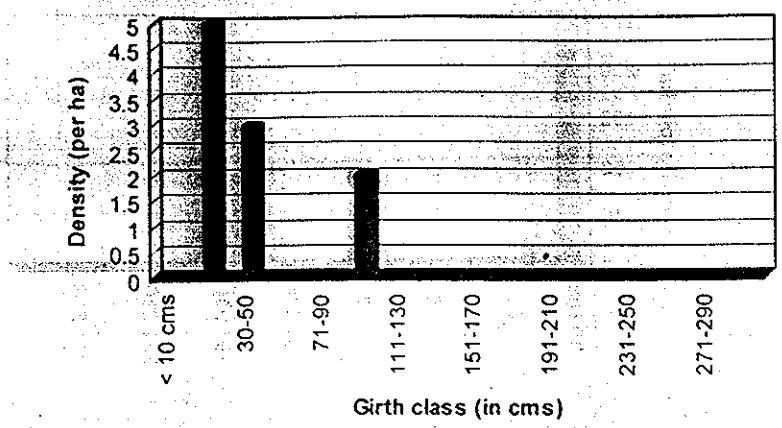


Chart 68: Size class distribution of Char, Talbahali Forest

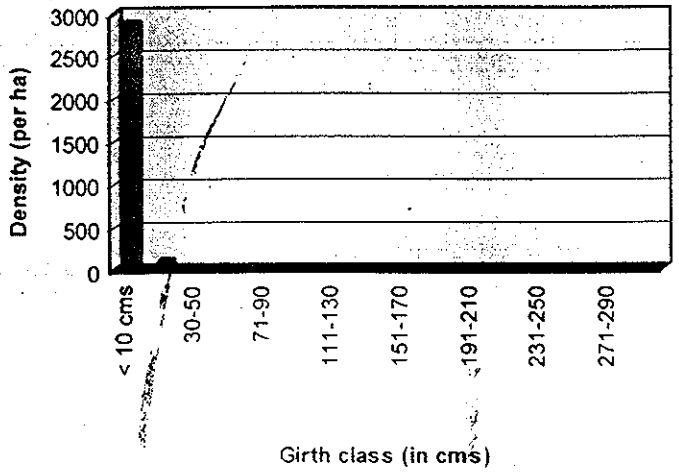


Chart 69: Size class distribution of Chauli, Talbahali forest

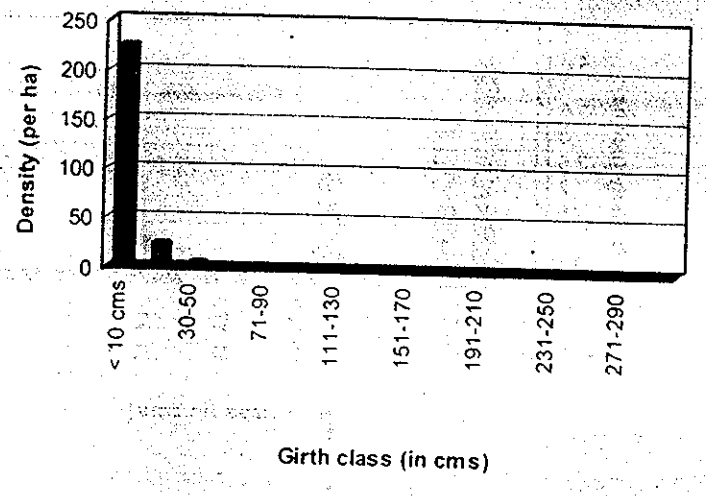


Chart 70: Size class distribution of Chuleigudi,Talbahali forest

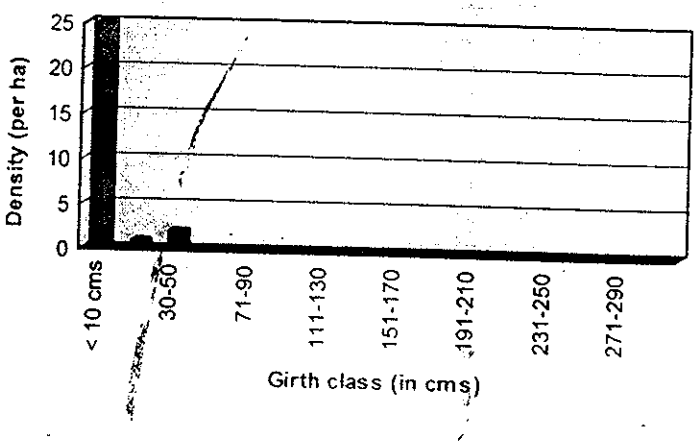


Chart 71: Size class distribution of Daka, Talbahali

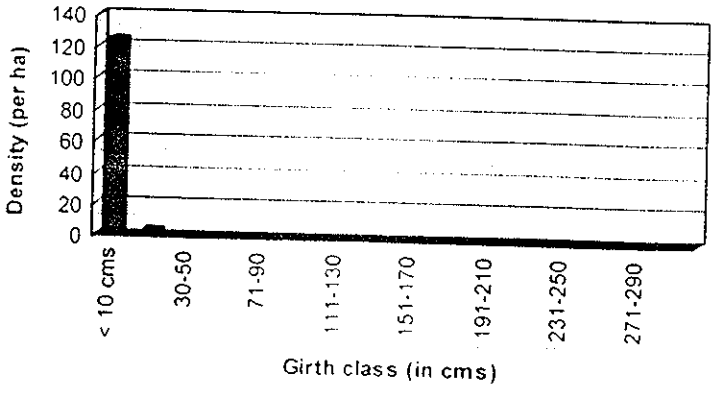


Chart 72: Size class distribution Dhamuni, Talbahali forest

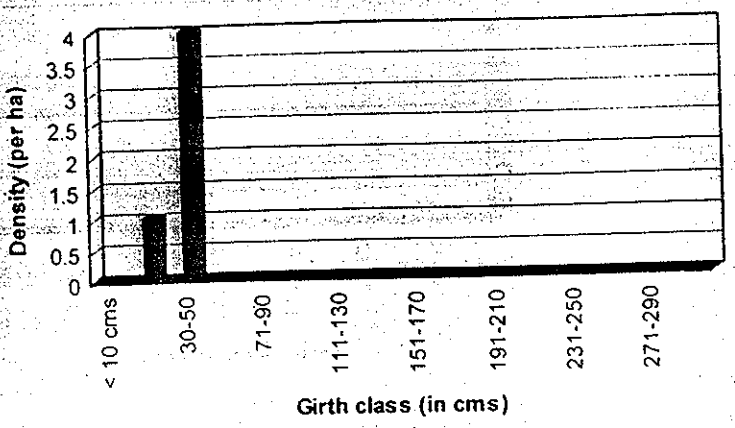


Chart 73: Size class distribution of Dhaula, Talbahali forest

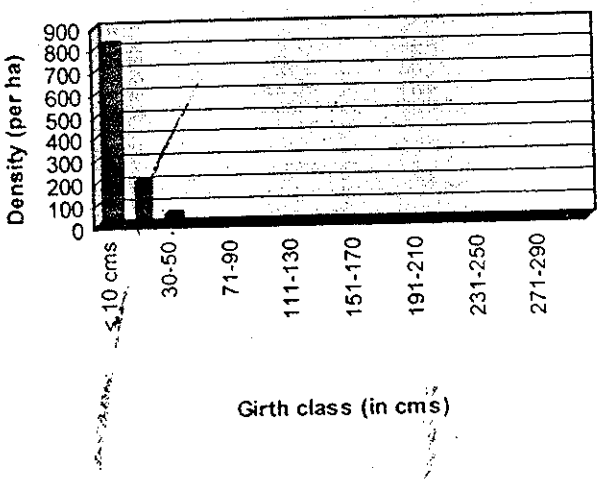


Chart 74: Size class distribution of Dhubuni, Talbahali forest

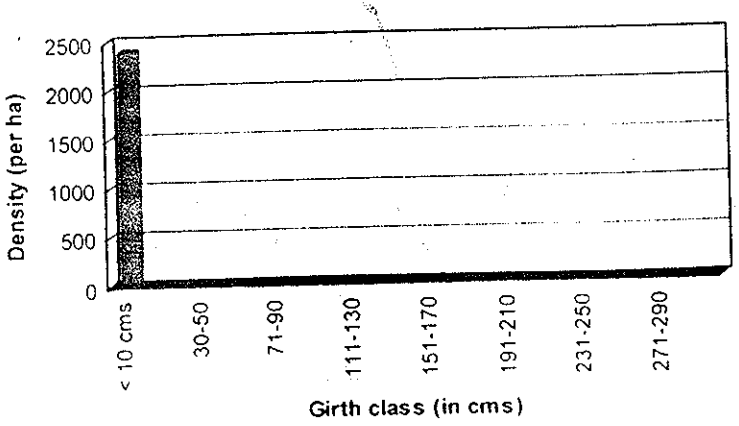


Chart 75: Size class distribution of Gamhari, Talbahali forest

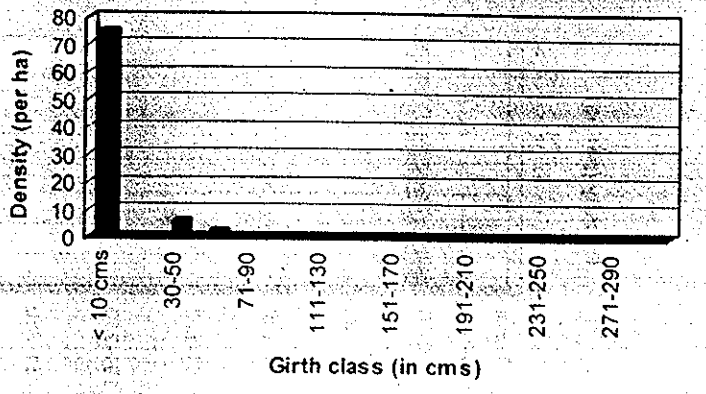


Chart 76: Size class distribution of Geda, Talbahali forest

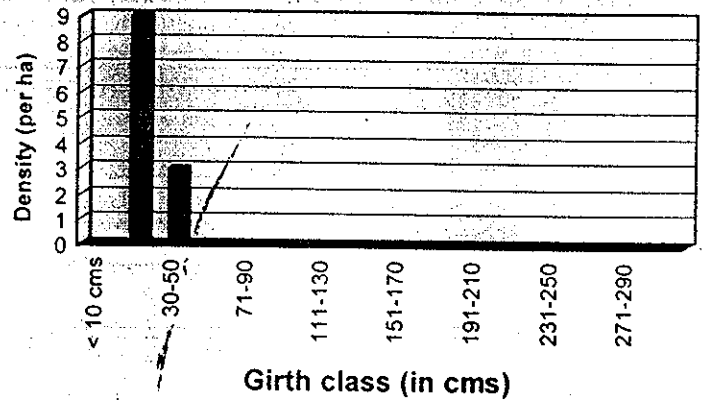


Chart 77; Size class distribution of Girdhini, Talbahali forest

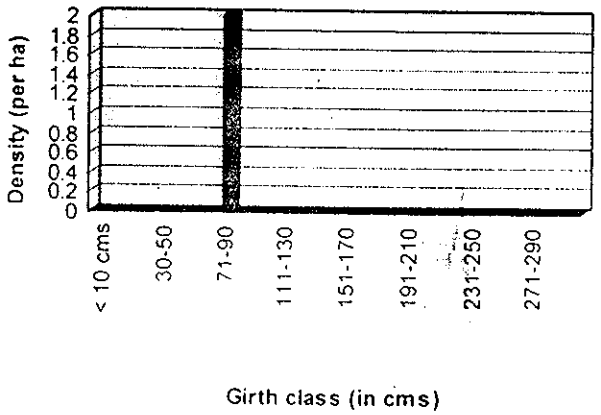


Chart 78: Size class distribution of Harida, Talbahali forest

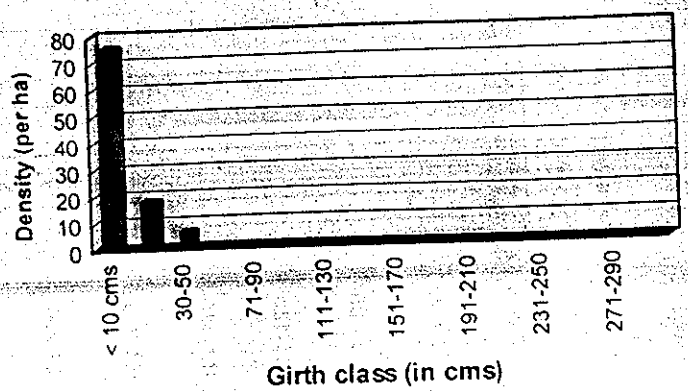


Chart 79: Size class distribution of Jamu,Talbahali forest

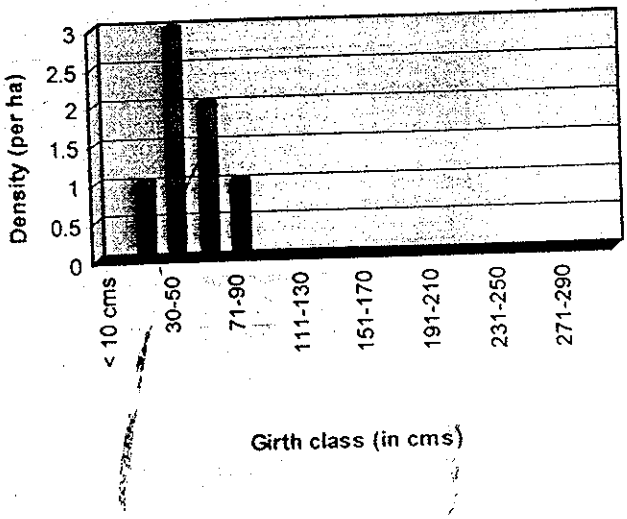


Chart 80: Size classs distribution of Kalam, Talbahali forest

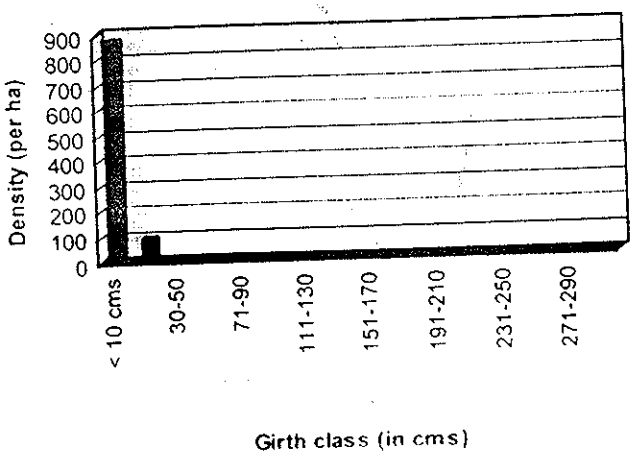


Chart 81: Size class distribution of Kantagachha,Talbahali forest

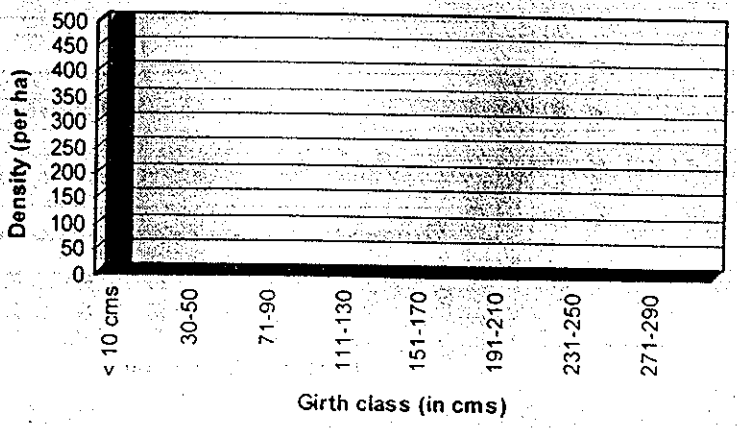


Chart 82: Size class distribution of Kashi,Talbahali forest

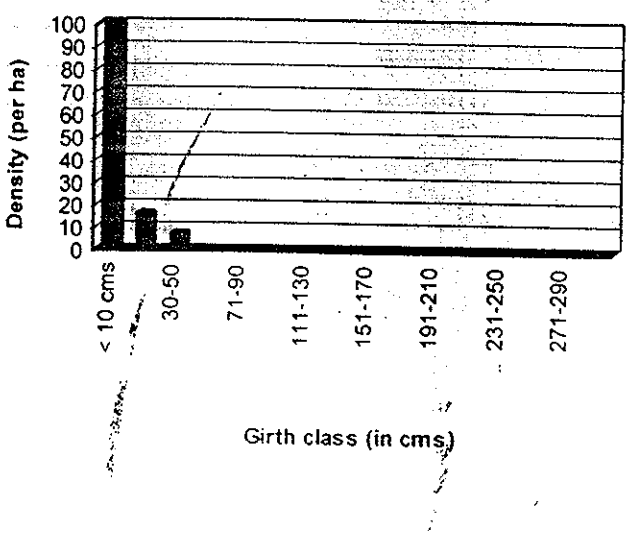


Chart 83: Size class distribution of Katha siali, Talbahali forest

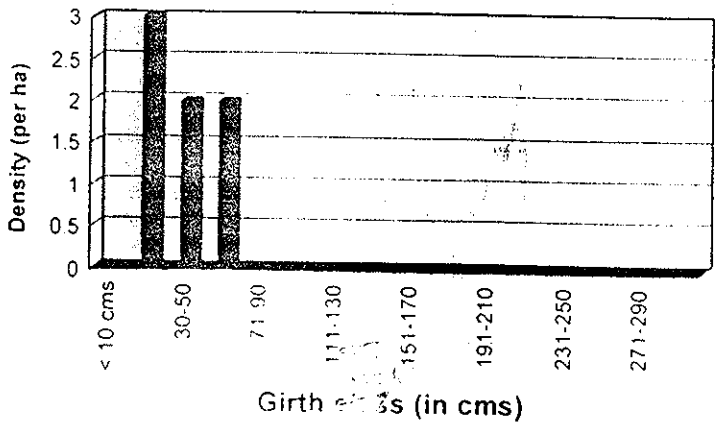


Chart 84: Size class distribution of Kendu, Talbahali forest

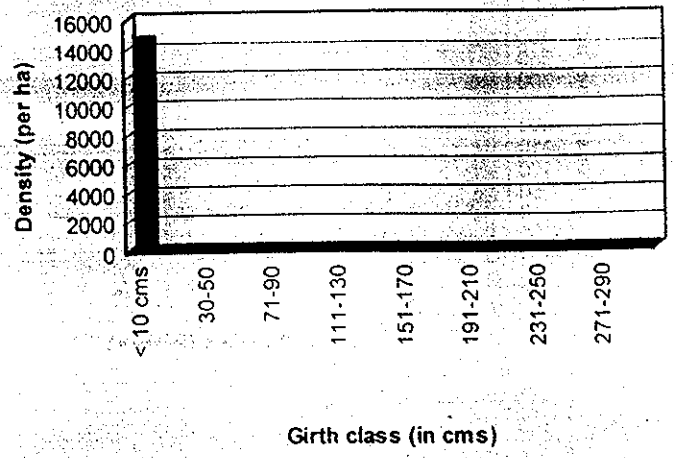


Chart 85: Size class distribution of Khais, Talbahali forest

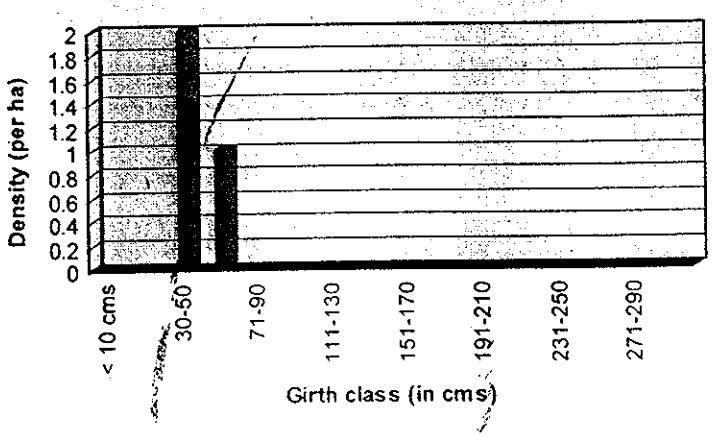


Chart 86: Size class distribution of Khasi, Talbahali forest

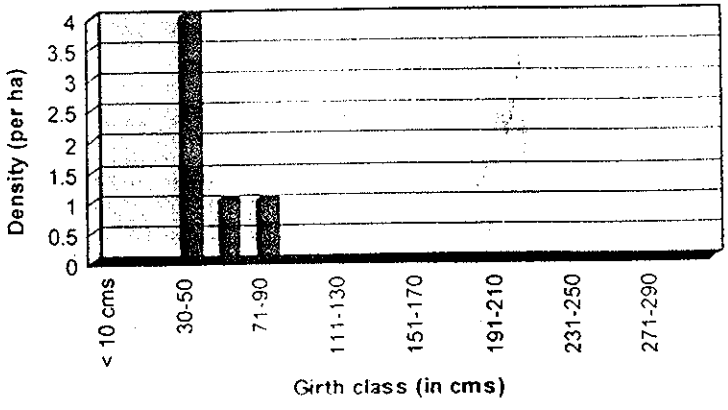


Chart 87: Size class distribution of Khurdu, Talbahali forest

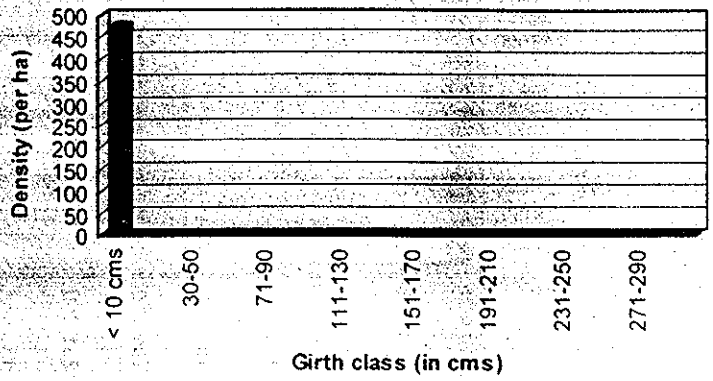


Chart 88: Size class distribution of Kukudahadi, Talbahali forest

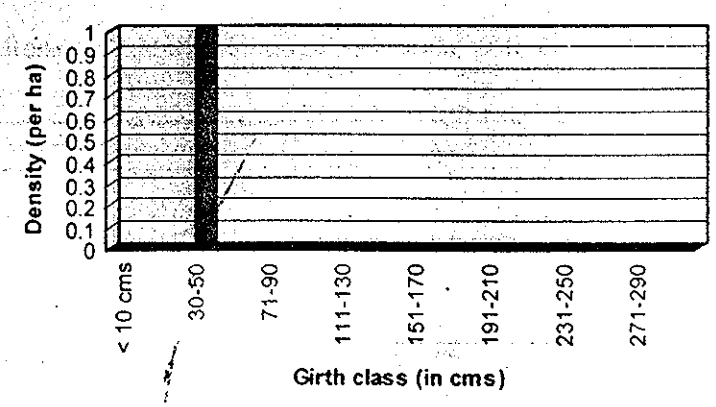


Chart 89: Size class distribution of Kusum, Talbahali forest

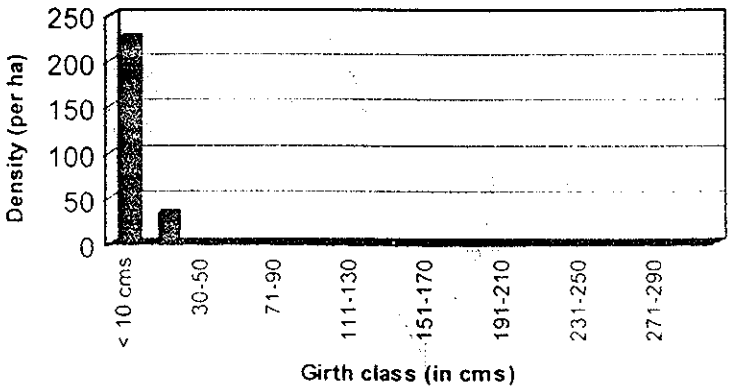


Chart 90: Size class distribution of Lakdakana, Talbahali forest

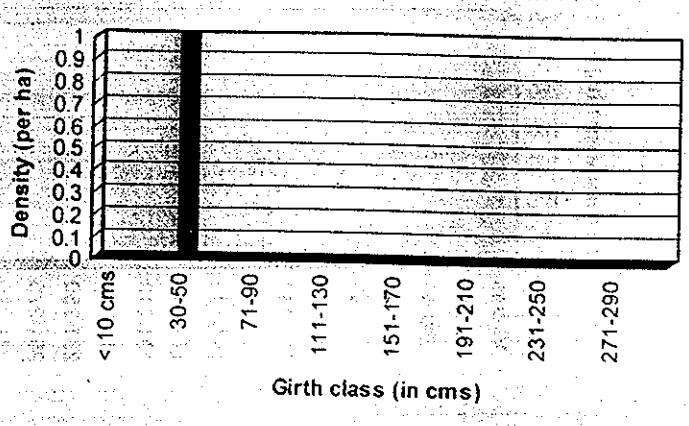


Chart 91: Size class distribution of Mahul, Talbahali forest

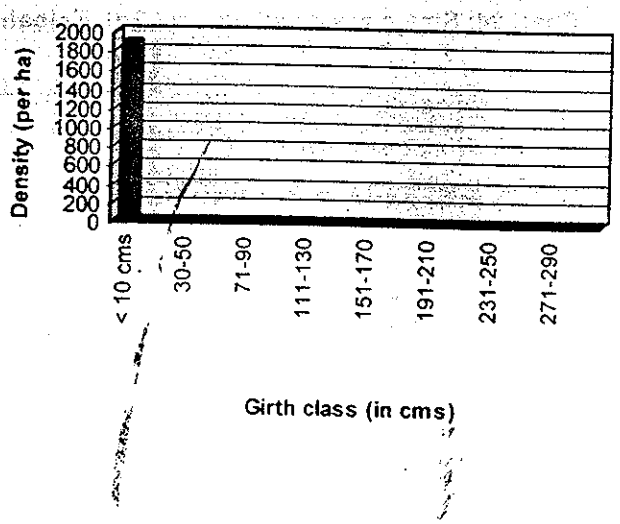


Chart 92: Size class distribution of Matha,Talbahali forest

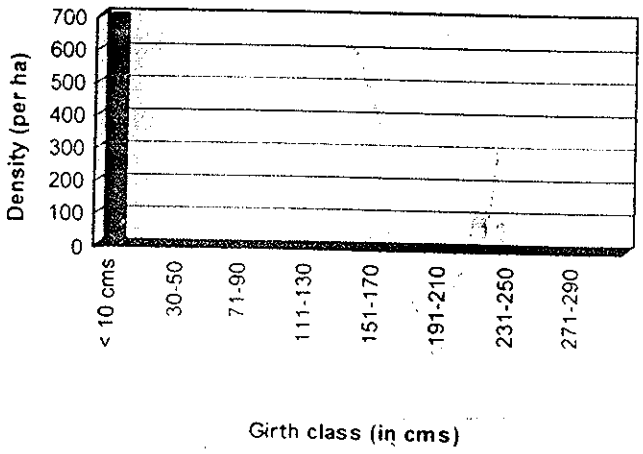


Chart 93: Size class distribution of Phenphena, Talbahali

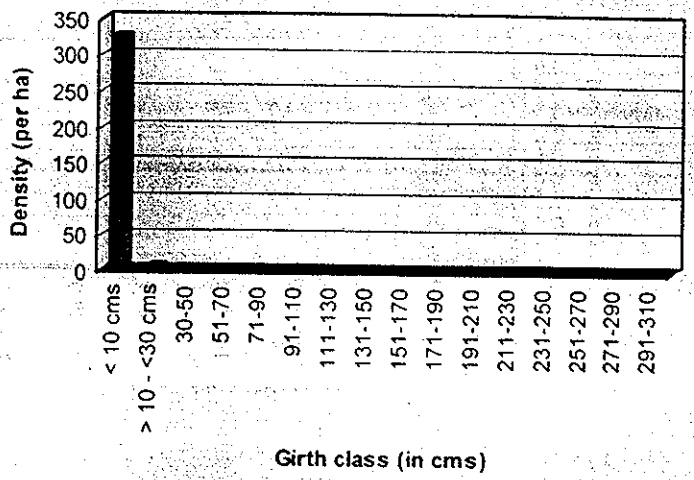


Chart 94: Size class distribution of Sal, Talbahali forest

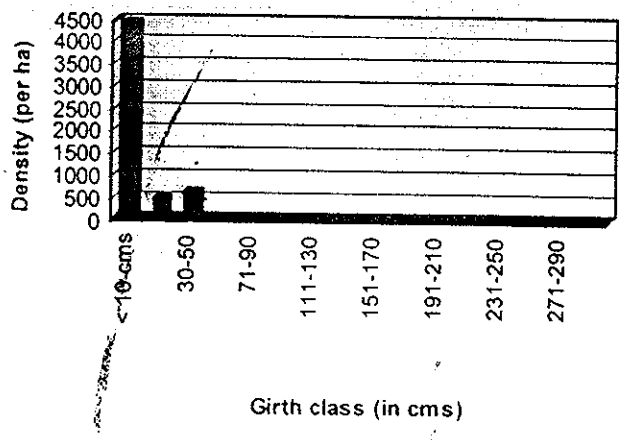


Chart 95: Size class distribution of Simili,Talbahali forest

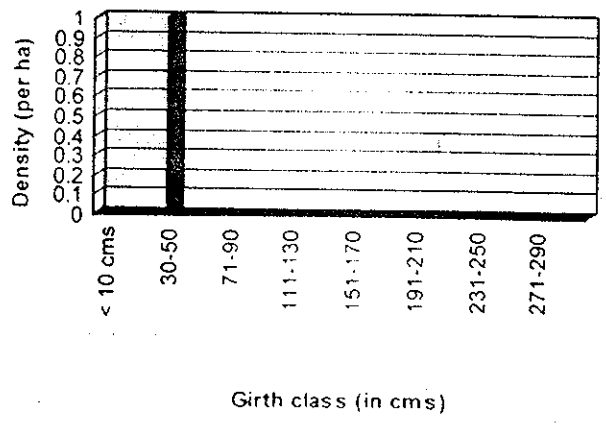


Chart 96: Size class distribution of Tentala, Talbahali forest

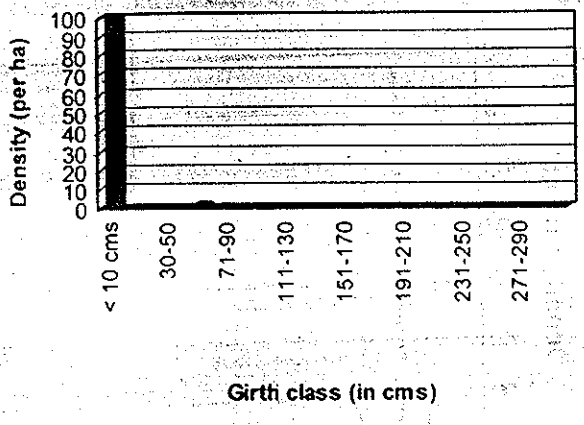
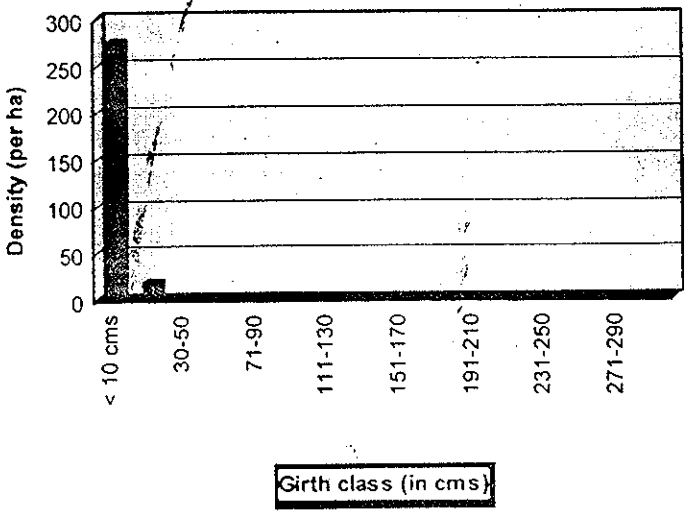


Chart 97: Size class distribution of Tilau, Talbahali forest



Frequency distribution of cut tree trunks, Talbahali forest (uncultivated)

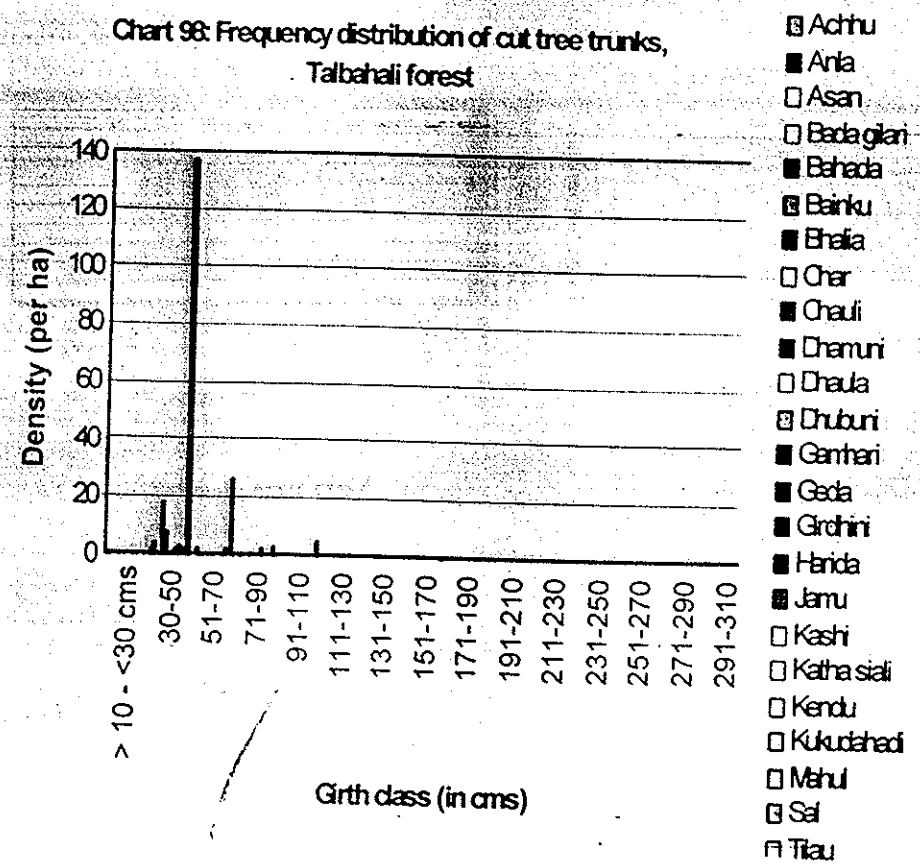


Chart 99: Size class distribution of Asan, 10 yrs fallow land, Talbahali

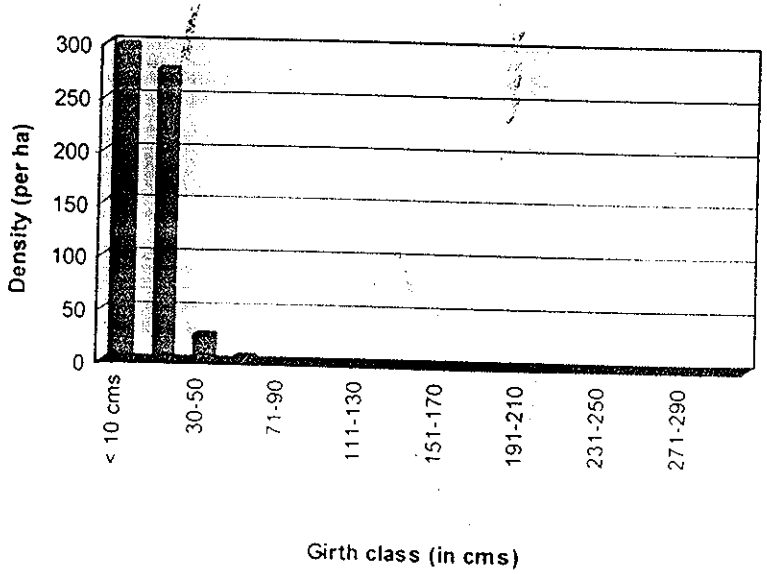


Chart 100: Size class distribution of Bahada, 10 yrs of fallow land, Talbahali

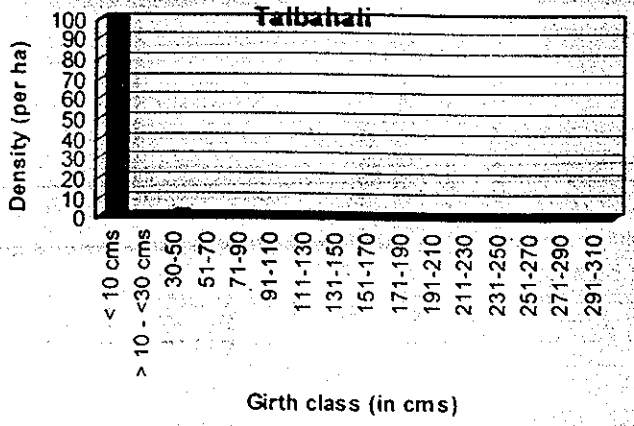


Chart 101: Size class distribution of Bhalia, 10 yrs of fallow land, Talbahali

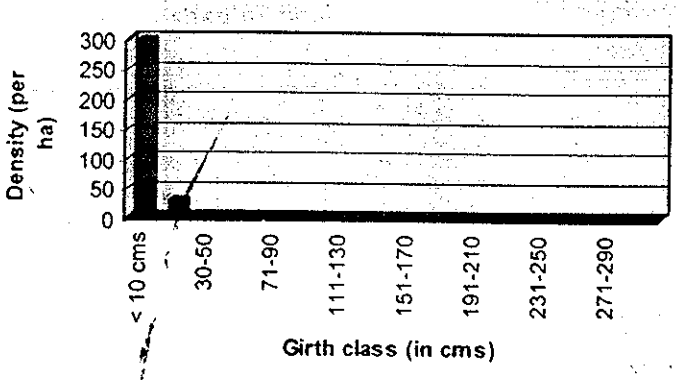


Chart 102: Size class distribution of Char, 10 Yrs of fallow land, Talbahali

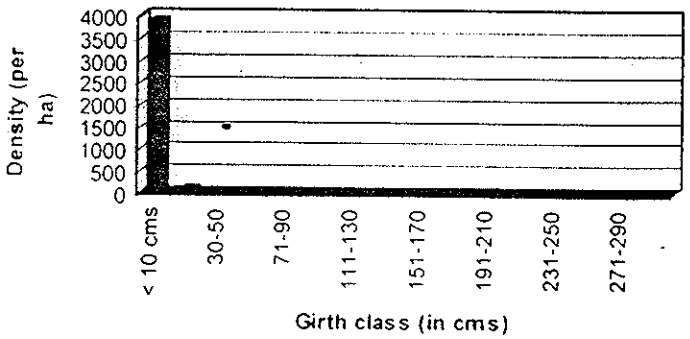


Chart 103: Size class distribution of Chauli, 10 yrs of fallow land, Talbahali

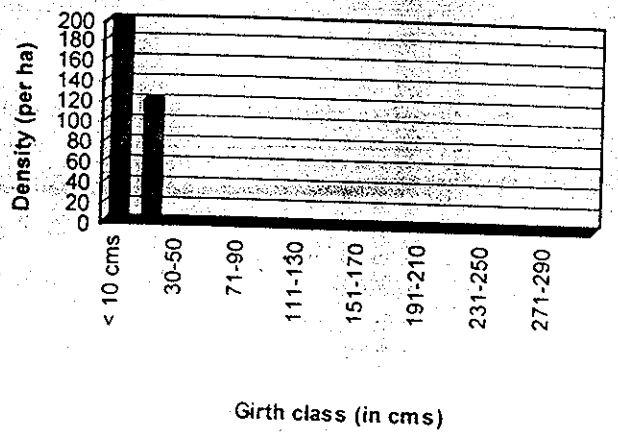


Chart 104: Size class distribution of Daka, 10 yrs of fallow land,Talbahali

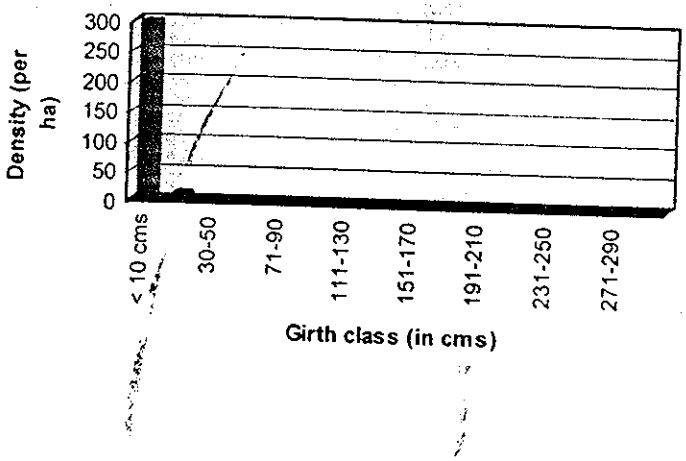


Chart 105: Size class distribution of Dhaula, 10 yrs of fallow land, Talbahali

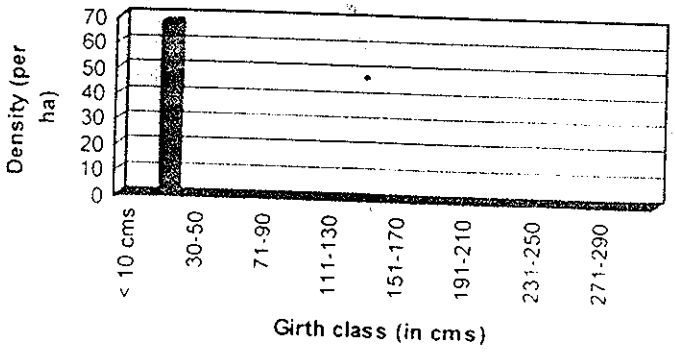


Chart 106: Size class distribution of Geda, 10 yrs of fallow land, Talbahali

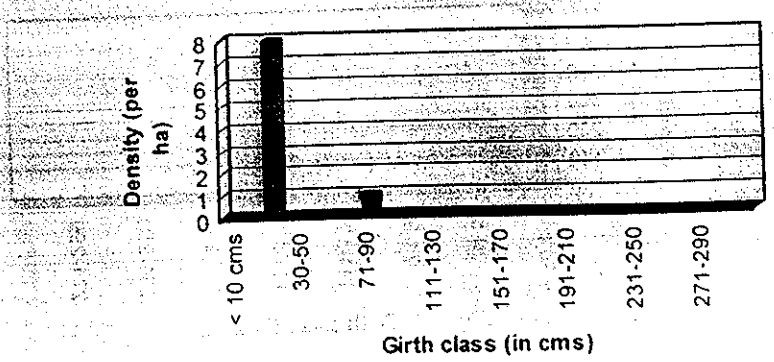


Chart 107: Size class distribution of Harida, 10 yrs of fallow land, Talbahali

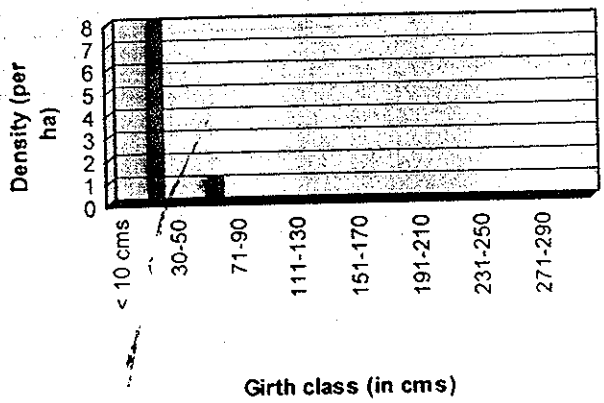


Chart 108: Size class distribution of Kalam, 10 yrs of fallow land, Talbahali

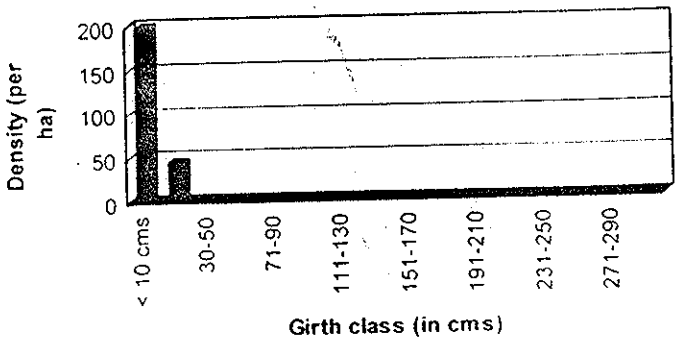


Chart 109: Size class distribution of Karada, 10 yrs of fallow land, Talbahali

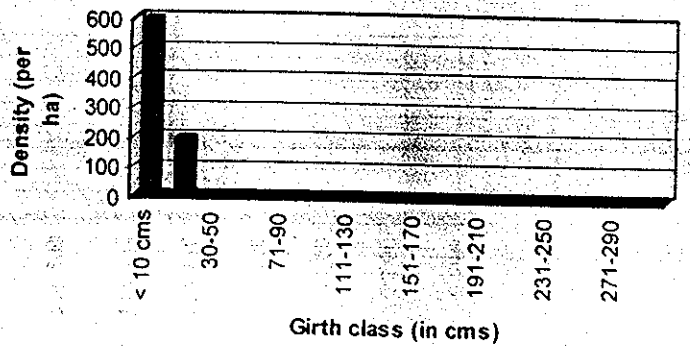


Chart 110: Size class distribution of Kendu,10 yrs of fallow land, Talbahali

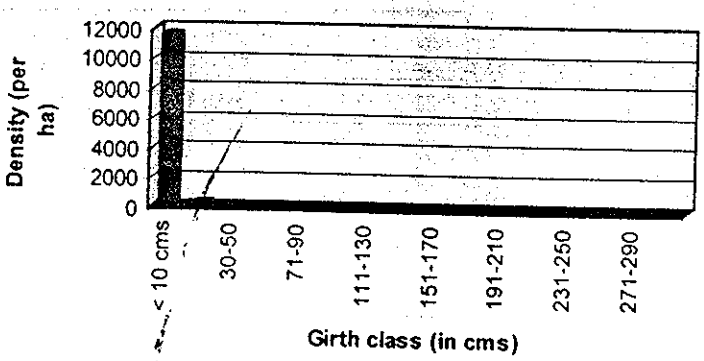


Chart 111: Size class distribution of Kumbhi, 10 yrs of fallow land, Talbahali

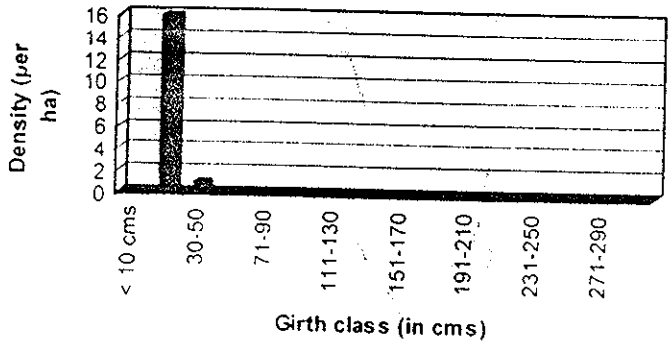


Chart 112: Size class distribution of Mahul, 10 yrs of fallow land, Talbahali

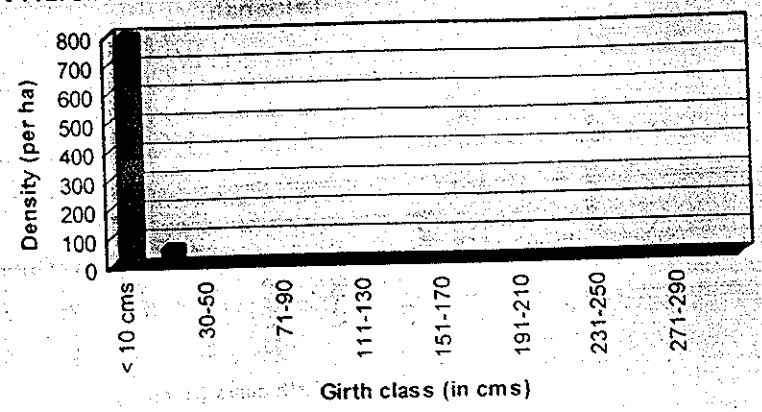


Chart 113: Size class distribution of Remini, 10 yrs of fallow land, Talbahali

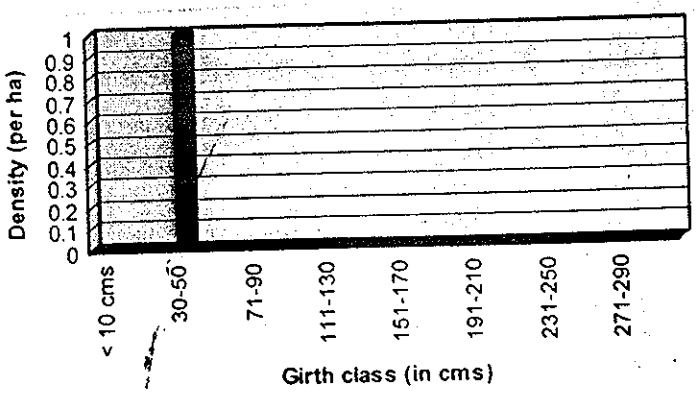


Chart 114: Size class distribution of Sal, 10 yrs fallow land, Talbahali forest

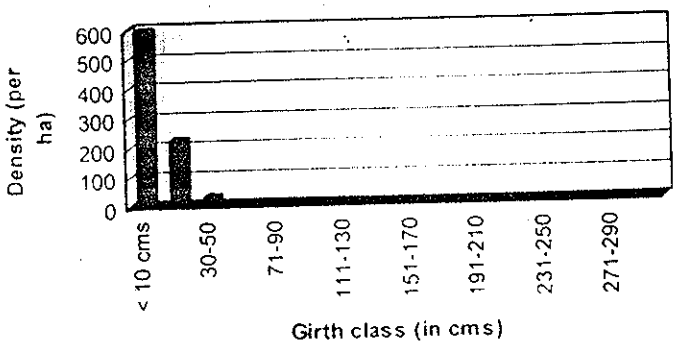


Chart 115: Size class distribution of Asan, 6 yrs of fallow land, Talbahali

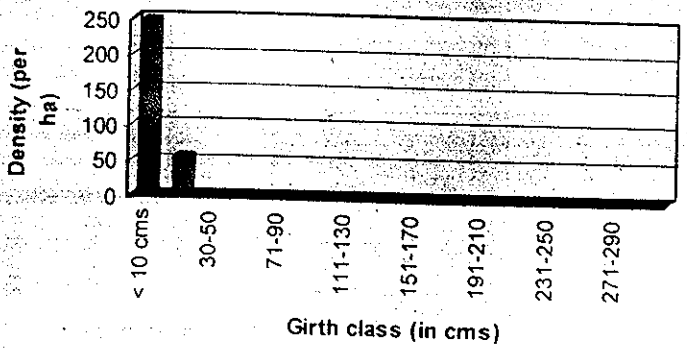


Chart 116: Size class distribution of Bija, 6 yrs of fallow land, Talbahali

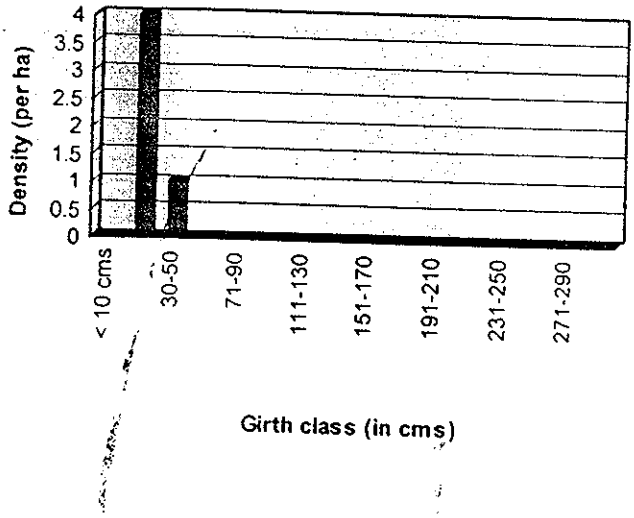


Chart 117: Size class distribution of Char, 6 yrs of fallow land, Talbahali

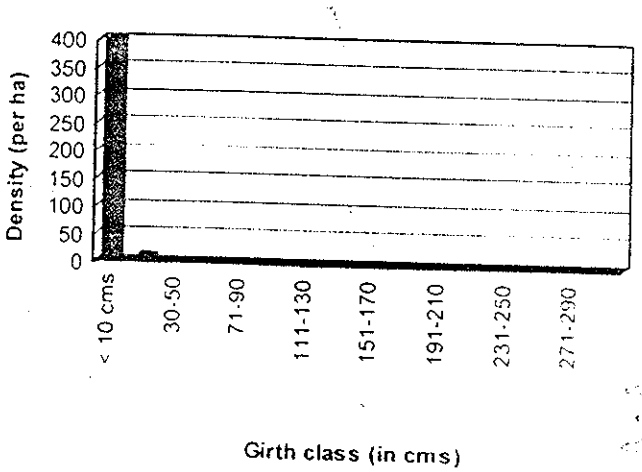


Chart 118: Size class distribution of Kendu, 6 yrs of fallow land

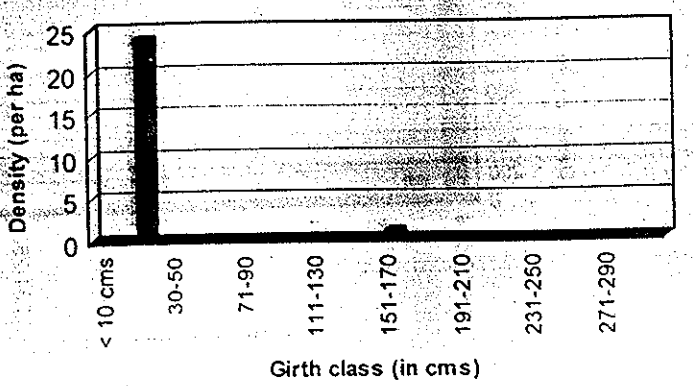


Chart 119: Size class distribution of Kusum, 6 yrs of fallow land, Talbahali

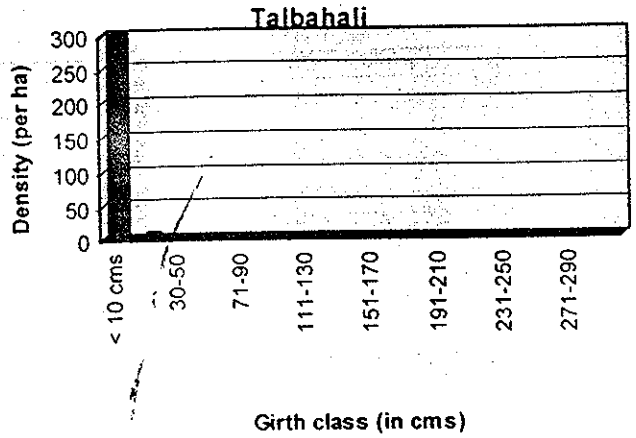


Chart 120: Size class distribution of Mahul, 6 yrs of fallow land, Talbahali

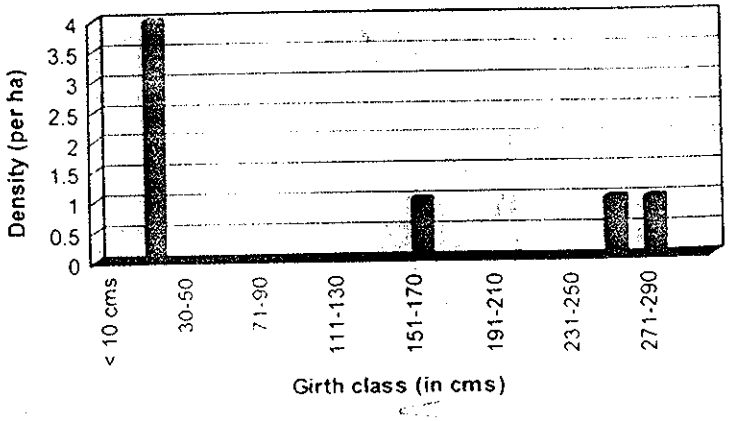


Chart 121: Size class distribution of Sal, 6 yrs of fallow land, Talbahali

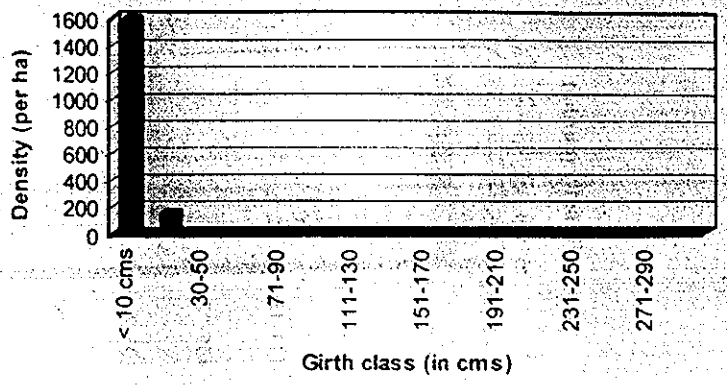


Chart 122: Size class distribution of Anchhu, 2 yrs of fallow land, Talbahali

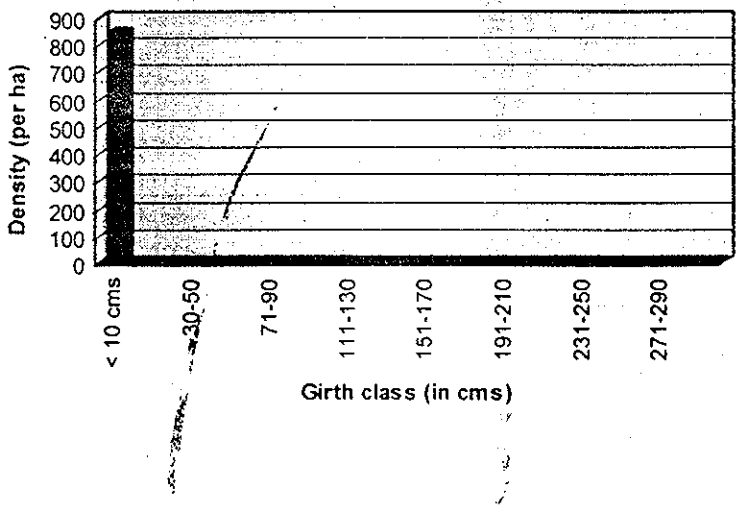


Chart 123: Size class distribution of Asan, 2 yrs of fallow land

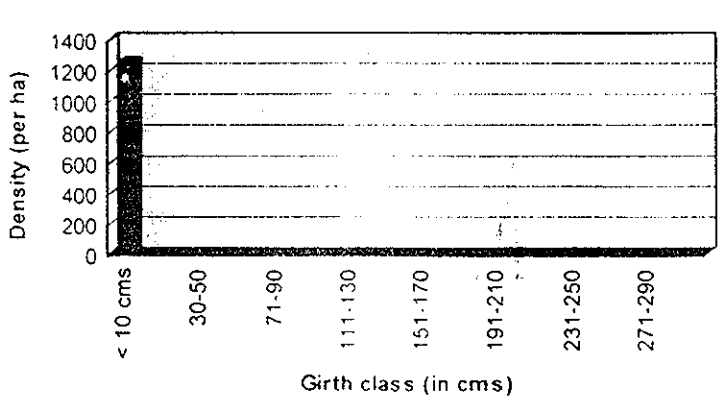


Chart 124: Size class distribution of Bahada, 2 yrs of fallow land, Talbahali

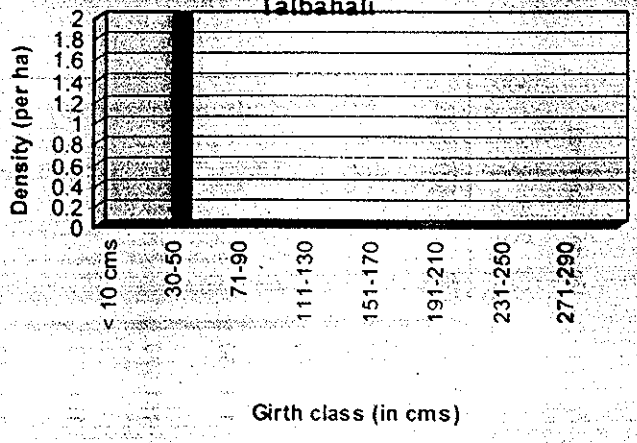


Chart 125: Size class distribution of Bhalia, 2 yrs of fallow land, Talbahali

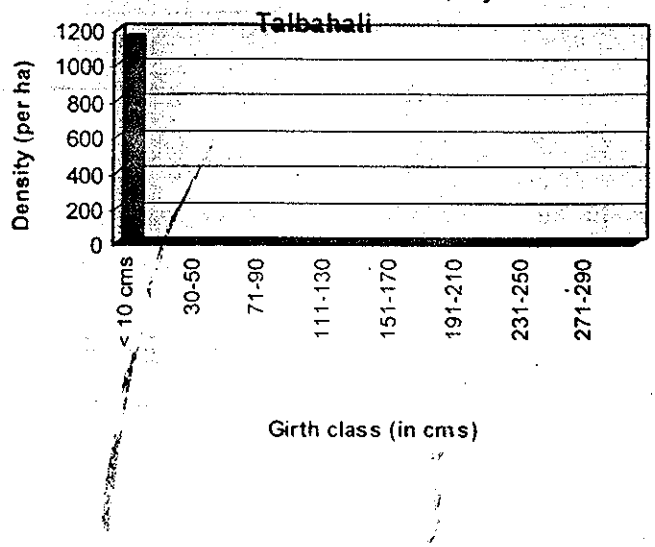


Chart 126: Size class distribution of Char, 2 yrs of fallow land, Talbahali

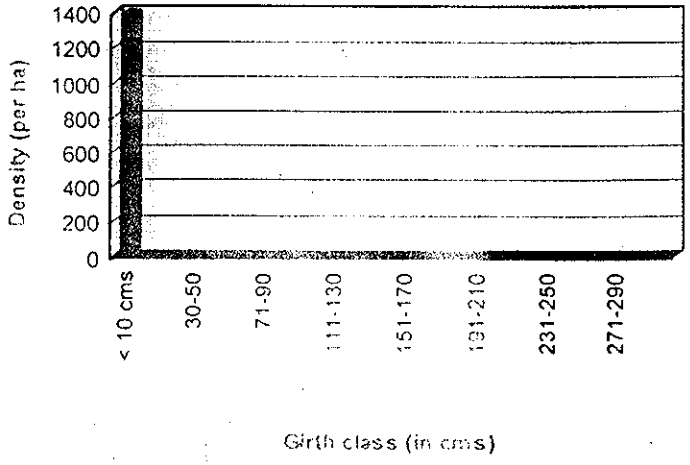


Chart 130: Size class distribution of Kendu, 2 yrs of fallow land, Talbahali

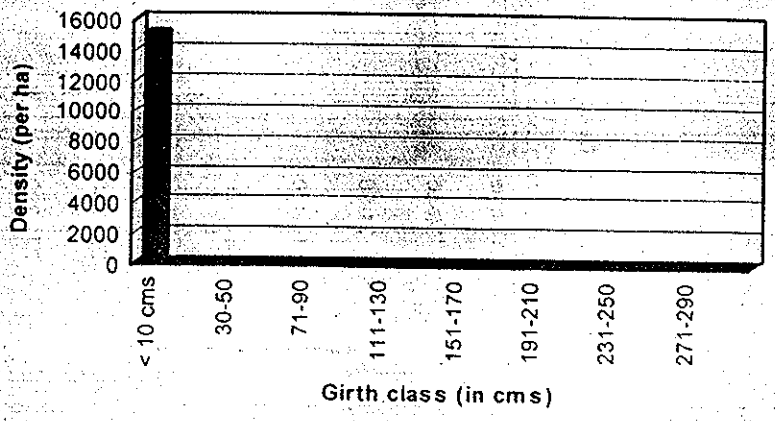


Chart 128: Size class distribution of Jamu, 2 yrs of fallow land, Talbahali

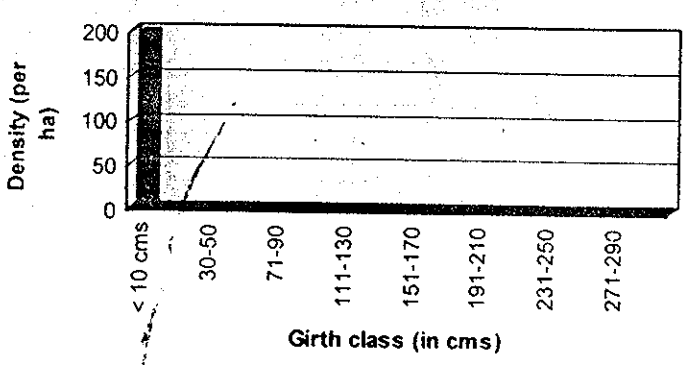


Chart 129: Size class distribution of Kalam, 2 yrs of fallow land, Talbahali

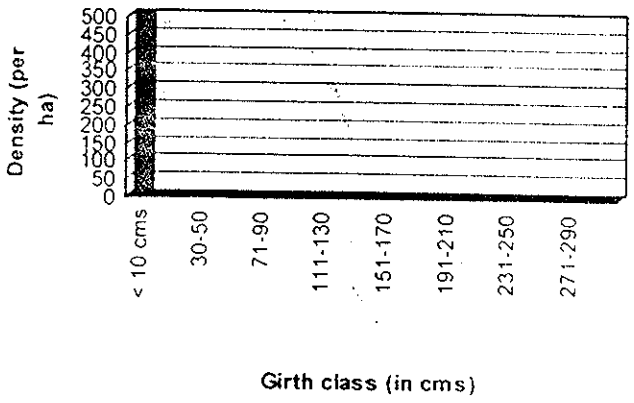


Chart 131: Size class distribution of Mahul, 2 yrs of fallow land, Talbahali

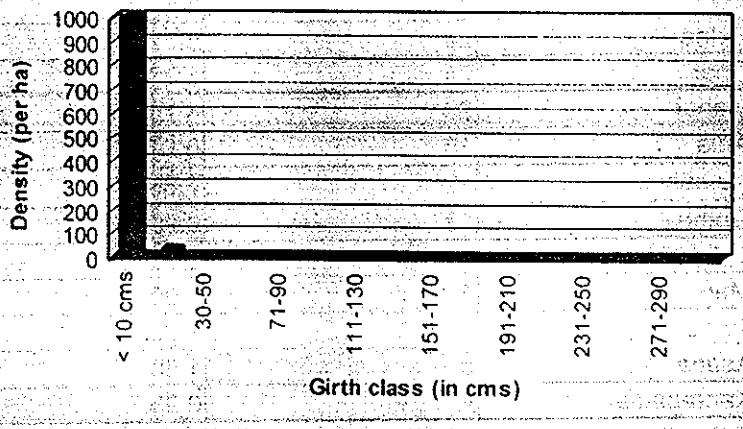


Chart 132: Size class distribution of Sal, 2 yrs of fallow land, Talbahali

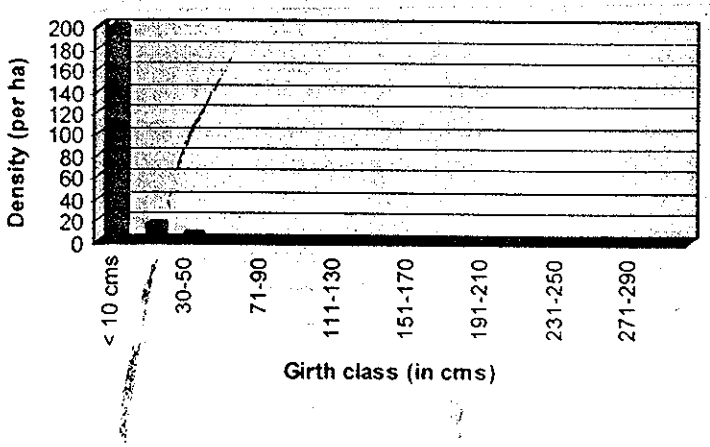


Chart 133: Size class distribution of sidha, 2 yrs of fallow land, Talbahali

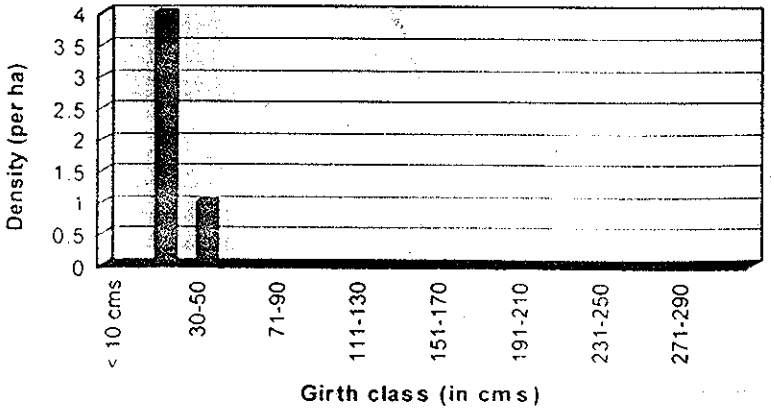


Table 4.15: Density of saplings and % of representation, Belabani, **Gadabanikilo**

Sl no	Tree saplings	Density (per ha)	% Representation	Cumulative %
1	Kalachua	176	41.90	41.90
2	Nirash	40	9.52	51.43
3	Bel	28	6.67	58.10
4	Sidha	28	6.67	64.76
5	Char	24	5.71	70.48
6	Mahul	20	4.76	75.24
7	Anla	16	3.81	79.05
8	Kumbhi	12	2.86	81.90
9	Gotha	12	2.86	84.76
10	Telakanhara	12	2.86	87.62
11	Mai	8	1.90	89.52
12	Jamu	8	1.90	91.43
13	Asana	8	1.90	93.33
14	Kantabaula	4	0.95	94.29
15	Katakala	4	0.95	95.24
16	Kendu	4	0.95	96.19
17	Khakda	4	0.95	97.14
18	Benta	4	0.95	98.10
19	Harida	4	0.95	99.05
20	Udalia	4	0.95	100.00
	Total	**420**		

Table 4.16: Density of saplings and % of representation, Gochar, **Gadabanikilo**

Sl no	Tree species	Density (per ha)	% of representation	Cumulative %
1	Mahul	1900	19.39	19.39
2	Kalachua	1900	19.39	38.78
3	Gaba	1900	19.39	58.16
4	Kendu	1250	12.76	70.92
5	Kerhuan	950	9.69	80.61
6	Nirash	600	6.12	86.73
7	Kochila	500	5.10	91.84
8	Kumbhi	400	4.08	95.92
9	Telakerhuan	250	2.55	98.47
10	Barakoli	150	1.53	100.00
	Total	**9800**		

Table 4.17: Density of saplings and % of representation, Godabandha, **Gadabanikilo**

Sl no	Tree species	Density (per ha)	% of representation	Cumulative %
1	Char	58	31.52	31.52
2	Mahul	42	22.83	54.35
3	Benta	16	8.70	63.04
4	Kendu	16	8.70	71.74
5	Kochila	8	4.35	76.09
6	Sidha	6	3.26	79.35
7	Aanla	4	2.17	81.52
8	Bahada	4	2.17	83.70
9	Karada	4	2.17	85.87
10	Kumbhi	4	2.17	88.04
11	Bel	2	1.09	89.13
12	Gamhari	2	1.09	90.22
13	Gaudakasha	2	1.09	91.31

14	Gotha	2	1.09	92.40
15	Harida	2	1.09	93.49
16	Jamu	2	1.09	94.58
17	Kalachua	2	1.09	95.67
18	Khakda	2	1.09	96.76
19	Kusum	2	1.09	97.85
20	Nirash	2	1.09	98.94
21	Piasal	2	1.09	100.03
	Total	**184**		

Table 4.18: Density of saplings and % of representation, Mahulabani, Gadabanikilo

Sl no	Tree species	Density (per ha)	% of representation	Cumulative %
1	Mahul	196	56.32	56.32
2	Kochila	44	12.64	68.97
3	Char	24	6.90	75.86
4	Kendu	24	6.90	82.76
5	Kalachua	20	5.75	88.51
6	Bhalia	8	2.30	90.80
7	Kumbhi	8	2.30	93.10
8	Benta	4	1.15	94.25
9	Gaudakasha	4	1.15	95.40
10	Halada	4	1.15	96.55
11	Karada	4	1.15	97.70
12	Mai	4	1.15	98.85
13	Sidha	4	1.15	100.00
	Total	**348**		

Table 4.19: Density of saplings and % of representation, Padar, Gadabanikilo

Sl no.	Tree saplings	Density (per ha)	% of representation	Cumulative %
1	Char	152	44.19	44.19
2	Mahul	92	26.74	70.93
3	Kumbhi	60	17.44	88.37
4	Kendu	28	8.14	96.51
4	Bel	8	2.33	98.84
5	Bhalia	4	1.16	100.00
	Total	**344**		

Table 4.20: Density of saplings and % of representation, Uncleaned Patch, Gadabanikilo

Sl no	Tree sps	Density (per ha)	% of representation	Cumulative %
1	Nirash	1425	64.16	64.16
2	Kalachua	496	22.33	86.49
3	Dalsingha	28	1.26	87.75
4	Kochila	28	1.26	89.01
5	Harida	20	0.90	89.91
6	Sidha	20	0.90	90.81
7	Kendu	16	0.72	91.54
8	Mahul	16	0.72	92.26
9	Morihan	16	0.72	92.98
10	Patuli	16	0.72	93.70
11	Benta	12	0.54	94.24
12	Char	12	0.54	94.78
13	Lunikoli	12	0.54	95.32
14	Panihalada	12	0.54	95.86
15	Telakerhuan	12	0.54	96.40

16	Asan	8	0.36	96.76
17	Halada	8	0.36	97.12
18	Jamu	8	0.36	97.48
19	Jhadapan	8	0.36	97.84
20	Karada	8	0.36	98.20
21	Mai	8	0.36	98.56
22	Bahada	4	0.18	98.74
23	Bel	4	0.18	98.92
24	Giringa	4	0.18	99.10
25	Kansa	4	0.18	99.28
26	Kantabaula	4	0.18	99.46
27	Katakala	4	0.18	99.64
28	Kerhaun	4	0.18	99.82
29	Narigini	4	0.18	100.00
	Total	**2221**		

Table 4.21: Density of tree saplings and % of representation, Mahuladunga, RF, Gadabanikilo

Sl no	Tree species	Density (per ha)	% representation	Cumulative %
1	Mahul	2250	26.47	26.47
2	Kalachua	1850	21.76	48.24
3	Harida	1700	20.00	68.24
4	Kerhuan	1100	12.94	81.18
5	Bahada	600	7.06	88.24
6	Bhalia	400	4.71	92.94
7	Char	250	2.94	95.88
8	Kendu	150	1.76	97.65
9	Nirash	100	1.18	98.82
10	Piasal	50	0.59	99.41
11	Sidha	50	0.59	100.00
	Total	**8500**		

Table 4.22: Density of tree sapling and % of representation, Reserve Forest, Karadapal

Sl no	Tree sps	Density (per ha)	% of representation	Cumulative %
1	Sal	87	42.86	42.86
2	Char	16	7.88	50.74
3	Dhaura	8	3.94	54.68
4	Pata	8	3.94	58.62
5	Asan	7	3.45	62.07
6	Datarangdaru	5	2.46	64.53
7	Gurba	5	2.46	67.00
8	Kashi	5	2.46	69.46
9	Kendu	5	2.46	71.92
10	Mahul	5	2.46	74.38
11	Tilai	5	2.46	76.85
12	Gandhapalash	4	1.97	78.82
13	Jamu	4	1.97	80.79
14	Aanla	3	1.48	82.27
15	Bahada	3	1.48	83.75
16	Bandan	3	1.48	85.23
17	Gurudi	3	1.48	86.71
18	Harida	3	1.48	88.19
19	Kandrei	3	1.48	89.67
20	Sharli	3	1.48	91.15
21	Sisoo	3	1.48	92.63

22	Dorli	2	0.99	93.61
23	Karada	2	0.98	94.59
24	Kusum	2	0.98	95.57
25	Ame	1	0.49	96.06
26	Ashok	1	0.49	96.55
27	Bainchakoli	1	0.49	97.04
28	Gamhari	1	0.49	97.53
29	Kakada	1	0.49	98.02
30	Kumbhi	1	0.49	98.51
31	Piasal	1	0.49	99.00
32	Rayu	1	0.49	99.49
33	Shetajaraka	1	0.49	99.98
		203		

Table 4.23: Study of saplings, Revenue Forest, Karadapal

Sl no.	Tree species	Density (per ha)	% of representation	Cumulative %
1	Sal	886	54.16	54.16
2	Char	336	20.54	74.69
3	Mahul	82	5.01	79.71
4	Kendu	74	4.52	84.23
5	Gandhapalash	62	3.79	88.02
6	Palash	46	2.81	90.83
7	Asan	38	2.32	93.15
8	Ame	24	1.47	94.62
9	Bhalia	24	1.47	96.09
10	Jia	16	0.98	97.07
11	Harida	14	0.86	97.92
12	Dhaura	6	0.37	98.29
13	Jamu	4	0.24	98.53
14	Karada	4	0.24	98.77
15	Kusum	4	0.24	99.01
16	Aanla	2	0.12	99.13
17	Bahada	2	0.12	99.25
18	Bhuruidaru	2	0.12	99.37
19	Gurudi	2	0.12	99.49
20	Kalachua	2	0.12	99.61
21	Kashi	2	0.12	99.73
22	Piasal	2	0.12	99.85
23	Sidha	2	0.12	99.97
	Total	1636		

Table 4.24: Density tree seedlings and % of representation, Belabani, Gadabanikilo

Sl no.	Tree species	No of seedlings/ha	% Representation	Cumulative %
1	Giringa	3650	42.94	42.94
2	Nirash	2500	29.41	72.35
3	Kaluchua	2000	23.53	95.88
4	Char	150	1.76	97.65
5	Bahada	100	1.18	98.82
6	Mahul	50	0.59	99.41
7	Kendu	50	0.59	100.00
	Total	8500		

Table 4.25: Density tree seedlings and % of representation, Gochar, Gadabanikilo

Sl no	Tree species	No of seedlings (per ha)	% of representation	Cumulative %
1	Kalachua	1500	21.13	21.13
2	Mahul	1350	19.01	40.14
3	Jhadapana	1250	17.61	57.75
4	Kendu	1100	15.49	73.24
5	Kumbhi	650	9.15	82.39
6	Kerhuan	500	7.04	89.44
7	Nirash	350	4.93	94.37
8	Barakoli	250	3.52	97.89
9	Kochila	150	2.11	100.00
	Total	**7100**		

Table 4.26: Density tree seedlings and % of representation, Godabandha, Gadabanikilo.

Sl no.	Tree seedlings	Density (per ha.)	% of representation	Cumulative %
1	Giringa	2050	44.57	44.57
2	Kalachua	1150	25.00	69.57
3	Nirash	900	19.57	89.13
4	Mahula	250	5.43	94.57
5	Char	150	3.26	97.83
6	Kerhuan	75	1.63	99.46
7	Bhrusunga	25	0.54	100.00
	Total	**4600**		

Table 4.27: Density of tree seedlings and% of representation, Mahulabani, Gadabanikilo

Sl no.	Tree species	per ha	% of representation	Cumulative %
1	Mahul	1750	33.6538	33.6538
2	Kendu	250	4.8077	38.4615
3	Char	650	12.5000	50.9615
4	Kumbhi	150	2.8846	53.8462
5	Kochila	50	0.9615	54.8077
6	Kalachua	600	11.5385	66.3462
7	Karada	50	0.9615	67.3077
8	Telakerhuan	450	8.6538	75.9615
9	Nirash	1200	23.0769	99.0385
10	Limba	50	0.9615	100.0000
	Total	**5200**		

Table 4.28: Density of tree seedlings and % of representation,Padar, Gadabanikilo

Sl no	Tree species	Density (per ha)	% of representation	Cumulative %
1	Kerhuan	1050	21	21
2	Bel	800	16	37
3	Kalachua	650	13	50
4	Asan	500	10	60
5	Sidha	450	9	69
6	Char	350	7	76
7	Kumbhi	350	7	83
8	Mahul	350	7	90
9	Kendu	300	6	96
10	Limba	150	3	99
11	Jungle Kaniar	50	1	100
	Total	5000		

Table 4.29: Density of tree seedlings and % of representation, Uncleaned patch, Gadabanikilo

Sl no	Tree sps	Density (per ha)	% of representation	Cumulative %
	Nirash	11050	59.89	59.89
1	Kalachua	3200	17.34	77.24
2	Jhadapan	1050	5.69	82.93
3	Panihalada	1050	5.69	88.62
4	Giringa	950	5.15	93.77
5	Morihan	500	2.71	96.48
6	Sidha	350	1.90	98.37
7	Kochila	300	1.63	100.00
	Total	**18450**		

Table 4.30: Density of tree seedlings and % of representation, Mahuladunga, Gadabanikilo

Sl no	Tree species	Density (per ha)	% representation	Cumulative %
1	Mahul	1500	32.61	32.61
2	Kalachua	950	20.65	53.26
3	Bhalia	650	14.13	67.39
4	Char	450	9.78	77.17
5	Kerhuan	450	9.78	86.96
6	Nimba	350	7.61	94.57
7	Nirash	150	3.26	97.83
8	Kendu	100	2.17	100.00
	Total	**4600**		

Table 4.31: Density of seedlings and % of representation, Reserve Forest, Karadapal

Sl no	Tree sps	Density (per ha)	% of representation	Cumulative %
1	Sal	515	32.54	32.54
2	Char	325	20.54	53.08
3	Kerhuan	150	9.48	62.56
4	Sharli	90	5.69	68.25
5	Dhaura	75	4.74	72.99
6	Garudaphala	75	4.74	77.73
7	Jamu	75	4.74	82.46
8	Kendu	62.5	3.95	86.41
9	Telakerhuan	50	3.16	89.57
10	Bel	40	2.53	92.10
11	Kantagachha	37.5	2.37	94.47
12	Limba	37.5	2.37	96.84
13	Ashok	25	1.58	98.42
14	Sidha	25	1.58	100.00
	Total	1582		

Table 4.32: Density of tree seedlings and % of representation, Revenue Forest, Karadapal

Sl no.	Tree species	Density (per ha)	% of representation	Cumulative %
1	Sal	2575	38.58	38.58
2	Kendu	1425	21.35	59.93
3	Char	950	14.23	74.16
4	Mahul	675	10.11	84.27
5	Dhaura	200	3.00	87.27
6	Gurudu	200	3.00	90.26
7	Kumbhi	175	2.62	92.88
8	Palash	175	2.62	95.51

9	Asan	75	1.12	96.63
10	Ashok	75	1.12	97.75
11	Airabhuta	50	0.75	98.50
12	Harida	50	0.75	99.25
13	Kerhuan	50	0.75	100.00
	Total	**6675**		

Table 4.33: Density of saplings and seedlings, Reserve Forest, Sal region, Suruguda.

Sl no	Tree species	Nsp tot/ ha	Nsd Tot/ha	% of Saplings	% of Seedlings
1	Aanla	50		100	0
2	Badga	25		100	0
3	Bahada	7		100	0
4	Baldiya	2		100	0
5	Barakoli	3		100	0
6	Bel	92	50	64.66	35.34
7	Beni	8		100	0
8	Bhelwan	17	38	31.19	68.81
9	Bheruan	88	75	53.83	46.17
10	Bhuli	42		100	0
11	Char	185	625	22.87	77.13
12	Dhaula	286		100	0
13	Ghuli	1		100	0
14	Harida	33		100	0
15	Jamu	11		100	0
16	Kantei	3		100	0
17	Karanj	33	8	80	20
18	Karla	37	17	69.03	30.97
19	Karma	8	25	24.24	75.76
20	Kathel	33	25	57.16	42.84
21	Kekat	47	17	73.67	26.33
22	Kendu	338	1659	16.92	83.08
23	Kerhuan		125	0	100
24	Khaesh	5		100	0
25	Khair	1		100	0
26	Kurei	136	8	94.24	5.76
27	Kusum	8	25	25.01	74.985003
28	Mahul	9		100	0
29	Muid	7		100	0
30	Palsa	1		100	0
31	Piasal	83	304	21.45	78.55
32	Rahena	2		100	0
33	Sahaj	373	300	55.39	44.61
34	Sargi	158	500	24.05	75.95
35	Semel	3		100	0
36	Senha	44		100	0
37	Simuli	2		100	0
38	Sunari	4		100	0

Table 4.34: Density of saplings and seedlings, Reserve Forest, Bamboo region, Suruguda.

sl no	tree species	Nsp (per ha)	Nsd (per ha)	% of saplings	% of seedlings
1	aanla	4	0	100	0
2	achhu	2	50	3.846154	96.15385
3	asan	26	0	65	0
4	baldiya	2	0	100	0
5	barakoli	12	150	7.407407	92.59259
6	bel	16	0	100	0
7	bheruan	80	1150	6.504065	93.49593
8	char	22	50	30.55556	69.44444
9	damkurlu	4	250	1.574803	98.4252
10	dhaura	496	100	83.22148	16.77852
11	dhuben	30	100	23.07692	76.92308
12	gamhari	2	0	100	0
13	ganjher	4	0	100	0
14	ghuli	2	0	100	0
15	gutkharka	4	400	0.990099	99.0099
16	kantei	16	0	100	0
17	karla	572	1400	29.00609	70.99391
18	kekat	34	50	40.47619	59.52381
19	kendu	80	16050	0.49597	99.50403
20	khaesh	4	0	100	0
21	kurei	8	0	100	0
22	kusum	2	0	100	0
23	mai	4	0	100	0
24	muid	2	0	100	0
25	mundi	2	0	100	0
26	piasal	16	0	100	0
27	rahena	4	100	3.846154	96.15385
28	salhiya	6	0	100	0
29	senha	76	50	60.31746	39.68254
30	simel	2	50	3.846154	96.15385
31	sunari	14	50	21.875	78.125
32	urudu	2	0	100	0

Table 4.35: study of tree regeneration, social forestry plantations, suruguda.

sl no	Tree sps	tree regeneration (Per ha)	Nsp %	Nsd %
1	kendu	2300	100	0
2	mahalimba	50	0	100
3	krushnachuda	17250		100
4	acacia	3000		100
5	chakunda	800	31.25	68.75
6	Pijuli	50		100
7	kantagachha	50		100
8	kuruahan	200		100
9	radhachuda	50	100	
10	sishu	1750		100
11	Limba	50	100	

Table 4.36 Density of regeneration stands, Baghamunda

		Saplings (per ha)	Seedlings (Per ha)	% reprsn (Saplings)	% reprsn (Seedlings)	Cum % (Sp)	Cum % (Sd)
1	Dhaura	420	100	15.58	0.54	15.58	0.54
2	Karda	302	2150	11.20	11.59	26.78	12.13
3	Char	283	1000	10.50	5.39	37.28	17.52
4	Asan	280	900	10.39	4.85	47.66	22.37
5	Sal	259	5000	9.61	26.95	57.27	49.33
6	Kendu	144	200	5.34	1.08	62.61	50.40
7	Anla	94	400	3.49	2.16	66.10	52.56
8	Gamhari	90	0	3.34	0.00	69.44	52.56
9	Mahul	76	300	2.82	1.62	72.26	54.18
10	Kurein	64	2150	2.37	11.59	74.63	65.77
11	Kashi	62	0	2.30	0.00	76.93	65.77
12	Patuli	52	0	1.93	0.00	78.86	65.77
13	Sidha	52	0	1.93	0.00	80.79	65.77
14	Mai	50	0	1.85	0.00	82.64	65.77
15	Kansa	44	0	1.63	0.00	84.27	65.77
16	Kurdungi	44	900	1.63	4.85	85.91	70.62
17	Bheru	42	1050	1.56	5.66	87.46	76.28
18	Damghurdu	37	350	1.37	1.89	88.84	78.17
19	Anchhu	29	50	1.08	0.27	89.91	78.44
20	Sishu	22	0	0.82	0.00	90.73	78.44
21	Bhuinkerhuan	21	700	0.78	3.77	91.51	82.21
22	Ghantuli	20	0	0.74	0.00	92.25	82.21
23	Kalikendu	19	300	0.70	1.62	92.95	83.83
24	Gutkhadka	18	1750	0.67	9.43	93.62	93.26
25	Kusum	18	300	0.67	1.62	94.29	94.88
26	Ghurdu	16	0	0.59	0.00	94.88	94.88
27	Bhuincha	14	0	0.52	0.00	95.40	94.88
28	Dhubuni	14	100	0.52	0.54	95.92	95.42
29	Bhalia	13	0	0.48	0.00	96.40	95.42
30	Chauli	11	0	0.41	0.00	96.81	95.42
31	Kumbhi	11	0	0.41	0.00	97.22	95.42
32	Sunari	11	0	0.41	0.00	97.63	95.42
33	Bahada	10	0	0.37	0.00	98.00	95.42
34	Bija	9	0	0.33	0.00	98.33	95.42
35	Harida	9	0	0.33	0.00	98.66	95.42
36	Samarsungha	6	0	0.22	0.00	98.89	95.42
37	Banjhan	4	0	0.15	0.00	99.04	95.42
38	Bel	4	50	0.15	0.27	99.18	95.69
39	Bukasungha	4	0	0.15	0.00	99.33	95.69
40	Girdhini	4	0	0.15	0.00	99.48	95.69
41	Paladhua	4	0	0.15	0.00	99.63	95.69
42	Baranga	3	0	0.11	0.00	99.74	95.69
43	Ganjhiari	2	0	0.07	0.00	99.81	95.69
44	Simili	2	0	0.07	0.00	99.89	95.69
45	Bidang	1	0	0.04	0.00	99.93	95.69

46	Jamla	1	0	0.04	0.00	99.96	95.69
47	Mundika	1	0	0.04	0.00	100.00	95.69
48	Barakoli	0	100	0.00	0.54	100.00	96.23
49.	Tentala	0	700	0.00	3.77	100.00	100.00
	Total	**2696**	**18550**	**100.00**	**100.00**		

Table 4.37:Density of saplings (forest), Talbahali

Sl No	Tree species	Density (per ha)
1	Ambila	0
2	anchhu	73
3	anla	67
4	asan	92
5	bada gilari	6
6	Bahada	5
7	Bainku	4
8	Banapalasha	15
9	Bandan	1
10	bhalia	7
11	Bija	5
12	Chadeigudi	1
13	char	123
14	chauli	24
15	Cherbeda	0
16	Daka	4
17	dhaula	201
18	Dhamuni	1
19	Dhubuni	3
20	Gamhari	0
21	Geda	9
22	ghanti	9
23	Gilari	0
24	Gutkharka	0
25	Harida	18
26	Jamu	1
27	kalam	89
28	Kanta gachha	6
29	kashi	16
30	katha siali	3
31	kendu	209
32	Khakda	65
33	khurdu	6
34	Kurchi	6
35	kusum	34
36	mahul	31
37	Majah	30
38	Matha	4
39	mundi kalasha	3
40	mundi tilei	3
41	Phenphena	7
42	sal	486
43	salara	1
44	sunari	0

45	Tilau	19
46	Tentala	0

Table 4.38: Tree species absolutely presented by regenearation stands, forest, Talbahali

Sl No	Tree species	seedlings	Saplings
1	Ambila	550	0
2	Cherbeda	1300	0
3	Dhema	350	0
4	ghanti	0	9
5	Gilari	4550	0
6	Gutkharka	50	0
7	Khakda	800	65
8	salara	0	1
9	sunari	50	0
10	Kurchi	1525	6
11	Majah	475	30
12	Matha	150	4
13	mundi kalasha	0	3
14	mundi tilei	0	3

Table 4.39: Density of seedlings (forest), Talbahali

Sl No	Tree species	Density /Ha	% of representation	Cumulative %
1	Kendu	14625	32.07236842	32.07236842
2	Gilari	4550	9.978070175	42.0504386
3	Sal	4450	9.75877193	51.80921053
4	Char	2900	6.359649123	58.16885965
5	Dhubuni	2400	5.263157895	63.43201754
6	Mahul	1900	4.166666667	67.59868421
7	Kurchi	1525	3.344298246	70.94298246
8	Cherbeda	1300	2.850877193	73.79385965
9	Asan	1225	2.686403509	76.48026316
10	Anchhu	1200	2.631578947	79.11184211
11	Anla	925	2.028508772	81.14035088
12	Kalam	875	1.918859649	83.05921053
13	Bainku	825	1.809210526	84.86842105
14	Dhaula	825	1.809210526	86.67763158
15	Khakda	800	1.754385965	88.43201754
16	Bada gilari	625	1.370614035	89.80263158
17	Ambila	550	1.206140351	91.00877193
18	Kanta gachha	500	1.096491228	92.10526316
19	Khurdu	475	1.041666667	93.14692982
20	Majah	475	1.041666667	94.18859649
21	Banapalasha	350	0.76754386	94.95614035
22	Dhema	350	0.76754386	95.72368421
23	Phenphena	325	0.712719298	96.43640351
24	Tilau	275	0.603070175	97.03947368
25	Chauli	225	0.493421053	97.53289474
26	Kusum	225	0.493421053	98.02631579
27	Matha	150	0.328947368	98.35526316
28	Bhalia	125	0.274122807	98.62938596
29	Daka	125	0.274122807	98.90350877

30	Kashi	100	0.219298246	99.12280702
31	Tentala	100	0.219298246	99.34210526
32	Gamhari	75	0.164473684	99.50657895
33	Harida	75	0.164473684	99.67105263
34	Gutkharka	50	0.109649123	99.78070175
35	Sunari	50	0.109649123	99.89035088
36	Bahada	25	0.054824561	99.94517544
37	Chadeigudi	25	0.054824561	100
38	Bandan	0	0	100
39	Bija	0	0	100
40	Dhamuni	0	0	100
41	Geda	0	0	100
42	Ghanti	0	0	100
43	Jamu	0	0	100
44	Katha siali	0	0	100
45	Mundi kalasha	0	0	100
46	Mundi tilei	0	0	100
47	Salara	0	0	100
		45600		

Table 4.40: Density of saplings (10 yrs of fallow land)

Sl No	Study of tree regenerations	Density /Ha
1	Ambila	0
2	Anchhu	136
3	Arila	36
4	Asan	276
5	Bada gilari	0
6	Bahada	0
7	Bainku	0
8	Banapalasha	8
9	Bandan	0
10	Bhalia	28
11	Bija	0
12	Chadeigudi	0
13	Char	112
14	Chauli	120
15	Cherbeda	0
16	Daka	12
17	Dhaula	68
18	Dhamuni	0
19	Dhema	0
20	Dhubuni	0
21	Gamhari	0
22	Geda	8
23	Ghanti	40
24	Gilari	8
25	Gutkharka	0
26	Harida	8
27	Jamu	12
28	Kalam	44
29	Kanta gachha	0
30	Karada	196

31	Kashi	16
32	Katha siali	8
33	Kendu	332
34	Khakda	72
35	Khurdu	0
36	Kurchi	204
37	Kusum	28
38	Kumbhi	16
39	Matha	12
40	Mahul	60
41	Majah	0
42	Mundi kalam	0
43	Mundi tilei	0
44	Phenphena	0
45	Sal	224
46	Salara	0
47	Sidha	8
48	Sunari	4
49	Tilau	0
50	Tentala	0

Table 4.41: Density of seedlings (10 yrs of fallow land)

Sl no	Study of tree regenerations	Density/Ha
1	Ambila	1400
2	Anchhu	1000
3	Ahla	2000
4	Asan	300
5	Bahada	100
6	Bainku	2700
7	Bhalia	300
8	Char	3900
9	Chauli	200
10	Dhubuni	400
11	Daka	300
12	Ghanti	700
13	Gilari	3900
14	Gutkharka	100
15	Kalam	200
16	Kalei kanta	1400
17	Karada	600
18	Khashi	700
19	Kendu	11700
20	Khakda	1400
21	Kurchi	5900
22	Kusum	1300
23	Mahul	800
24	Mana	600
25	Sal	600
26	Sidha	400

Table 4.42 : Density of tree saplings,6 yrs of fallow land,Talbahali

Sl no	Tree sps	Density/Ha
1	Ambila	4
2	Anchhu	48
3	Asan	56
4	Banapalasha	4
5	Banakauria	8
6	Bhalia	40
7	Bija	4
8	Char	12
9	Charseria	12
10	Dhaula	24
11	Dhubuni	4
12	Geda	4
13	Harida	8
14	Jamu	4
15	Kalam	28
16	Karada	76
17	Kashi	12
18	Kendu	24
19	Khakda	48
20	Kurchi	44
21	Kusum	8
22	Matha	4
23	Mahul	4
24	Mana	20
25	Mukunda	4
26	Sal	160
27	Sunari	28
28	Tilau	68
29	Theu	4

Table 4.43: Density of tree seedlings,6 yrs of fallow land,Talbahali

Sl no	Tree sps	Density/Ha
1	Ambila	400
2	Anchhu	950
3	Asan	250
4	Bainku	300
5	Banapalasha	300
6	Bhalia	550
7	Char	400
8	Dhaula	450
9	Kalam	700
10	Karada	5950
11	Kashi	50
12	Khakda	350
13	Kurchi	480
14	Kusum	300
15	Majah	500
16	Sal	1600

Table 4.44: Density of tree saplings, 2 yrs of fallow land,Talbahali		
Sl no	**Tree sps**	Density/Ha
1	Anchhu	8
2	Anla	4
3	Asan	4
4	Char	8
5	Dhaula	4
6	Gamhari	4
7	Ghanti	4
8	Jamu	4
9	Kalam	4
10	Karada	12
11	Kendu	16
12	Kurchi	8
13	Kumbhi	4
14	Mahul	36
15	Sal	16
16	Sidha	4

Table 4.45: Density of tree seedlings, 2 yrs of fallow land,Talbahali

Sl no	Tree sps	Density/Ha
1	Anchhu	850
2	Anla	960
3	Asan	1260
4	Bainku	950
5	Bhalia	1150
6	Char	1400
7	Chauli	650
8	Dhubuni	760
9	Gilari	850
10	Jamu	200
11	Kalam	500
12	Kashi	100
13	Kendu	15160
14	Khakda	500
15	Kulei	4556
16	Kurchi	5000
17	Kusum	200
18	Matha	1200
19	Mahul	1000
20	Sal	200

Table 4.46: Anthropogenic pressure on forest, Talbahali forest (uncultivated)

Sl no	Tree species	No of trees cut (per ha)	Total no of trees	% of trees cut (species wise)
1	Achhu	2	9	22.22
2	Anla	3	6	50.00
3	Asan	10	25	40.00
4	Bada gilari	1	11	9.09
5	Bahada	1	1	100.00
6	Bainku	1	3	33.33

7	Bhalia	4	10	40.00
8	Bija	1	5	20.00
9	Char	4	47	8.51
10	Chauli	2	6	33.33
11	Chuleigudi	1	2	50.00
12	Daka	1	1	100.00
13	Dhamuni	1	4	25.00
14	Dhaula	19	60	31.67
15	Dhubuni	2	6	33.33
16	Jamu	4	6	66.67
17	Kantagachha	2	2	100.00
18	Katha siali	2	4	50.00
19	Kendu	2	14	14.29
20	Khaish	1	3	33.33
21	Khasi	3	6	50.00
22	Khurdu	1	4	25.00
23	Mahul	1	24	4.17
24	Matha	1	2	50.00
25	Sal	167	734	22.75
26	Tentala	2	3	66.67
27	Tilau	2	4	50.00
	Total	**241**	**1002**	**24.05**

Total No of trees in entire tree population per ha = 1062
Total No of trees cut per ha = 241
% of trees cut Vs total tree population (per ha) = 22.70
No of species disturbed (per ha) = 27
Total No of species existing in entire tree population per ha = 41
% of tree species disturbed = 65.85

Table 4.47: Density of shrubs and % of representation, Belabani, Gadabanikilo

Sl no	Shrub species	No of bunches/ha	% of representation	Cumulative %
1	Kukurchhelia	27550	86.77165354	86.77165354
2	Guakoli	4000	12.5984252	99.37007874
3	Muturi	200	0.62992126	100
	Total	**31750**		

Table 4.48: Density of shrubs and % of representation, Gochar, Gadabanikilo

Sl no	Shrub species	No of bunches (per ha.)	% of representation	Cumulative %
1	Balibhaincha	1300	3.32	3.32
2	Ankukoli	12000	30.61	33.93
3	Pokasungha	4800	12.24	46.18
4	Kukurchhelia	3800	9.69	55.87
5	Naguari	650	1.66	57.53
6	Gaudakasha	4750	12.12	69.65
7	Shagadabatua	550	1.40	71.05
8	Phirika	3750	9.57	80.62
9	Guakoli	5150	13.14	93.75
10	Nahalbeli	1900	4.85	98.60
11	Kanteikoli	550	1.40	100.00
	Total	39200		

Table 4.49: Density of shrubs and % of representation, Godabandha, Gadabanikilo.

Sl no	Shrub species	Density (per ha)	% of representation	Cumulative %
1	Kukurchhelia	10300	40.12	40.12
2	Guakoli	4575	17.82	57.94
3	Pokasungha	3650	14.22	72.15
4	Benta	2300	8.96	81.11
5	Ankukoli	2150	8.37	89.48
6	Phirikakanta	925	3.60	93.09
7	Shagadabatua	650	2.53	95.62
8	Nahalbeli	500	1.95	97.57
9	Phiringa	250	0.97	98.54
10	Keruhan	150	0.58	99.12
11	Khandakoli	150	0.58	99.71
12	Kanteikoli	75	0.29	100.00
	Total	**25675**		

Table 4.50: Density of shrubs and % of representation, Mahulabani, Gadabanikilo

Sl no	Shrub species	Density (per ha)	% of representation	Cumulative %
1	Ankukoli	10250	32.18	32.18
2	Kukurchhelia	7500	23.55	55.73
3	Guakoli	4200	13.19	68.92
4	Phirika	2300	7.22	76.14
5	Nahalbeli	2200	6.91	83.05
6	Pokasungha	2200	6.91	89.95
7	Shagadabatua	1650	5.18	95.13
8	Baincha	1550	4.87	100.00
	Total	**31850**		

Table 4.51: Density of shrubs and % of representation, Padar, Gadabanikilo

Sl no.	Shrubs species	Density (per ha)	% of representation	Cumulative %
1	Ankukoli	13500	34.09	34.09
2	Guakoli	7850	19.82	53.91
3	Kukurchhelia	5000	12.63	66.54
4	Pokasungha	3250	8.21	74.75
5	Phirika	2000	5.05	79.80
6	Nahalbeli	1700	4.29	84.09
7	Baincha	1650	4.17	88.26
8	Shagadabatua	1500	3.79	92.05
9	Khandakoli	800	2.02	94.07
10	Naguari	650	1.64	95.71
11	Gaudakasha	400	1.01	96.72
12	Salarakanta	350	0.88	97.60
13	Kaincha	250	0.63	98.23
14	Kanaarkanta	250	0.63	98.86
15	Tharthara	250	0.63	99.49
16	Kanteikoli	200	0.51	100.00
	Total	**39600**		

Table 4.52: Density of shrubs and % of representation, Uncleaned patch, Gadabanikilo

Sl no	Shrub species	Density (per ha)	% representation	Cumulative %
1	Guakoli	7150	67.14	67.14
2	Kukurchhelia	2550	23.94	91.08
3	Phirika	950	8.92	100.00
	Total	**10650**		

Table 4.53: Density of shrubs and % of representation, Mahuladunga, Gadabanikilo

Sl no	Shrub species	Density (per ha)	% representation	Cumulative %
1	Ankukoli	4050	28.22	28.22
2	Pokasungha	3150	21.95	50.17
3	Phirikakanta	2450	17.07	67.25
4	Guakoli	2250	15.68	82.93
5	Bainchakoli	900	6.27	89.20
6	Nahalbeli	900	6.27	95.47
7.	Jalakanta	200	1.39	96.86
8	banabanaka	150	1.05	97.91
9	Kukurchhelia	150	1.05	98.95
10	Salarakanta	100	0.70	99.65
11	Malara kanta	50	0.35	100.00
	Total	**14350**		

Table 4.54: Density of shrub species and % of representation,Reserve Forest, Karadapal

Sl no	Shrub species	Density (per ha)	% representation	cumulative %
1	Pokasungha	350	27.67	27.67
2	Chirayita	300	23.72	51.38
3	Pala	240	18.97	70.36
4	Bainchakoli	200	15.81	86.17
5	Uter	150	11.86	98.02
6	Shetajaraka	25	1.98	100.00
	Total	**1265**		

Table 4.55: Density of shrub species and % of representation, Revenue Forest, Karadapal

Sl no	Shrub species	Density (per ha)
1	Pala(*Phoenix*)	175

Table 4.56: Density of shrubs, Sal Belt, Suruguda.

sl no	shrub species	
1	barakoli	Nb (per ha)
2	dhatuk	80
3	kanmurali	300
4	khajuri	1220
5	kukurenta	400
6	labka	20
	Total	100
		2120

Table 4.57: Density of shrubs, Bamboo Region, Reserve Forest, Suruguda.

Sl no	Shrub sps	Nb (per ha)
1	Barakoli	50
2	Kanmurli	700
3	Dhatuk	600

Table 4.58: Density of shrubs

Sl no	Shrub species	Nb (200 sqm)	Per ha
1	Chukuda	36	1800
2	Phutus	4	200
3	Apamaranga	58	2900
4	Putus	29	1450

Chart 134: Distribution of bamboo clumps, Bamboo belt, Reserve Forest, Suruguda.

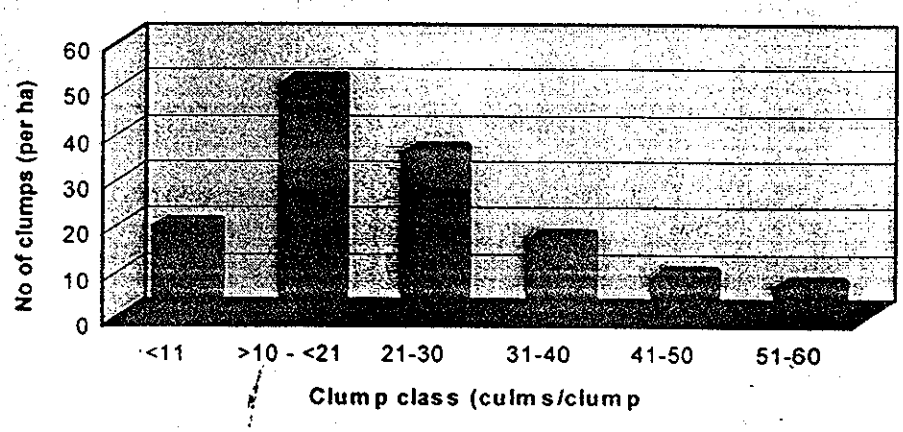


Chart 135: Harvest and regeneration of bamboo culms, Bamboo belt, Reserve Forest, Suruguda

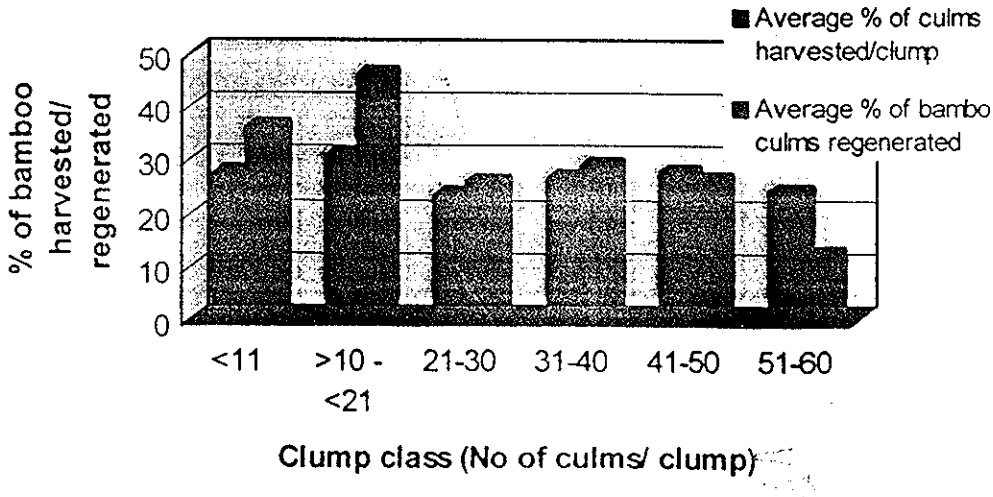


Table 4.59: Density of herbs and % of representation, Belabani, Gadabanikilo

Sl no	Herbs	Density/ha	% representation	Cumulative %
1	Khadika	125000	53.76344086	53.76344086
2	Juna	65000	27.95698925	81.72043011
3	Khirikoli	42500	18.27956989	100
	Total	**232500**		

Table 4.60: Density of herbs and % of representation, Gochar, Gadabanikilo

Sl no	Shrub species	Density (per ha)	% representation	Cumulative %
1	Balibhaincha	1300	3.32	3.32
2	Ankukoli	12000	30.61	33.93
3	Pokasungha	4800	12.24	46.18
4	Kukurchhelia	3800	9.69	55.87
5	Naguari	650	1.66	57.53
6	Gaudakasha	4750	12.12	69.65
7	Shagadabatua	550	1.40	71.05
8	Phirika	3750	9.57	80.62
9	Guakoli	5150	13.14	93.75
10	Nahalbeli	1900	4.85	98.60
11	Kanteikoli	550	1.40	100.00
	Total	**39200**		

Table 4.61: Density of herbs and % of representation, Godabandha, Gadabanikilo

Sl no	Herb species	Density(per ha	% of representation	Cumulative %
1	Khadika	83750	30.88	30.88
2	Chadheigodia	77500	28.57	59.45
3	Juna	35000	12.90	72.35
4	Ankukoli	30000	11.06	83.41
5	Nainangudia	18750	6.91	90.32
6	Khirikoli	15000	5.53	95.85
7	Guakoli	5000	1.84	97.70
8	Bana-nalita	2500	0.92	98.62
9	Gandhani	2500	0.92	99.54
10	Khandakoli	1250	0.46	100.00
	Total	**271250**		

Table 4.62: Density of herbs and % of representation, Mahulabani, Gadabanikilo

Sl no	Herb species	Density(per ha	% of representation	Cumulative %
1	Juna	85000	37.78	37.78
2	Chadheigodia	50000	22.22	60.00
3	Bhuilimba	25000	11.11	71.11
4	Khadika	25000	11.11	82.22
5	Kolathia	15000	6.67	88.89
6	Khandakoli	12500	5.56	94.44
7	Vananalita	7500	3.33	97.78
8	Gopakahna	5000	2.22	100.00
	Total	**225000**		

Table 4.63: Density of herbs and % of representation, Padar, Gadabanikilo

Sl no	Herb species	Density (per ha)	% representation	Cumulative %
1	Khadika	280000	26.29	26.29
2	Budhamundia	230000	21.60	47.89
3	Juna	190000	17.84	65.73
4	Mutha	180000	16.90	82.63

5	Chadheigodia	85000	7.98	90.61
6	Chadhei langudia	32500	3.05	93.66
7	suraganthia	25000	2.35	96.01
8	Duba	22500	2.11	98.12
9	Khirikoli	10000	0.94	99.06
10	Surugundia	10000	0.94	100.00
	Total	**1065000**		

Table 4.64: Density of herbs and % of representation, Uncleaned patch, Gadabanikilo

Sl no	**Herb species**	**Density (per ha)**	**% representation**	**Cumulative %**
1	Bhuin nimba	7500	42.86	42.86
2	Juna	5000	28.57	71.43
3	Satabari	5000	28.57	100.00
		17500		

Table 4.65: Density of herbs and % of representation, Mahuladunga, Gadabanikilo

Sl no.	**Herb species**	**Density(per ha**	**% representation**	**Cumulative %**
1	Juna	252500	48.10	48.10
2	Khadika	150000	28.57	76.67
3	Chadheigodia	62500	11.90	88.57
4	Bhuinkamuda	27500	5.24	93.81
5	Balajhadi	17500	3.33	97.14
6	Gharapodi	10000	1.90	99.05
7	Gopakahna	5000	0.95	100.00
	Total	**525000**		

Table 4.66: Density of herbs and % of representation, Mahulabani, Gadabanikilo

Sl no.	**Herb species**	**Density(per ha)**	**% of representation**	**Cumulative %**
1	Bhuinkamuda	81250	57.32	57.32
2	Gharapodi	14000	9.88	67.20
3	Khadika	10000	7.05	74.25
4	Gopakahna	9000	6.35	80.60
5	Juna	6500	4.59	85.19
6	Lajakuli	6000	4.23	89.42
7	Hadapada	5000	3.53	92.95
8	Chadheigodia	3750	2.65	95.59
9	Krushnaparni	3750	2.65	98.24
10	Chireyita	2500	1.76	100.00
	Total	**141750**		

Table 4.67: Basal Area, Standing Woody Biomass of different sites

Sites/ Villages	Forest patches	Basal Area (sq m/Ha)		SWB		MAI(t/Ha/yr)
		1996	1999	1996	1999	
Gadabanikilo	Uncleaned	20.67	21.34	169.00	175.92	2.13
	Belabani					
	Godabandha	10.83*	14.34	88.00	117.69	9.13
	Mahulabani					
	Mahuladunga	0.76	4.29	5.00	34.04	8.9361
	Gochar		0.74		4.49	
	Padar	0.52	0.83	3.00	5.29	0.7047
Karadapal	Atei RF		26.71		220.58	6.26
	Ganjiatangar		18.92		155.79	4.42
Suruguda	Sal Belt	**11.855**	**96.946**			**2.7533**
	Bamboo belt	**2182.04**			**18152 (yr 2000)**	**515.542**
	Social Forestry	17.88			147.06 (yr 2000)	4.18
Baghamunda			**5.125** (yr 2000)		**40.95** (yr 2000)	**1.16**
Talbahali	Uncultivated		20.14 (yr 2000)		165.94 (yr 2000)	4.71 (yr 2000)
	10 Yrs fallow		2.77 (yr 2000)		21.41 (yr 2000)	0.60 (yr 2000)
	6 Yrs fallow		2.73 (yr 2000)		21.09 (yr 2000)	0.599 (yr 2000)
	2 Yrs fallow		2.61 (yr 2000)		20.03 (yr 2000)	0.569 (yr 2000)

IMPACT OF FOREST PROTECTION ACTIVITY:

Suruguda

Forest Regeneration

1. Existence of 648 trees per ha in the sal belt and 246 trees per ha in the bamboo belt indicate that the existing management system has enabled successful growth and establishment of root coppices, tree seedlings and saplings and improved a forest which was once denuded. Complete closure of the protection patch, introduction of penalty systems, formation of a 10 member committee for supervision of protection activities, decision of imposing fines against patrolling defaulters, measures taken for fighting forest fires during the initial years (1985 - 90), these steps have helped to revive a forest which had been reduced to trees and shrubs. Operational rules such as prohibiting carrying cutting instruments and associated fines if noticed, restricting entry to cattle and villagers of other surrounding villages, allowing cattle of Suruguda only during the pre-monsoon season, selection of mango grove for grazing during

other periods of the year were further encouraging steps towards the goal. The successful resolution of the conflict between Suruguda and Chhatenpalli villages and the assistance of the FD in shaping the committee to a formal set up had positive repercussions on the protection effort.

2. Normally, Sal and Gamhari branches are chopped off and taken away for their high timer value. Prohibition of carrying cutting instruments to the forest has reduced human disturbance as was clearly demonstrated by a survey of sample plots. (see box). Analysis of sample plots indicates that in the sal belt 3 Sal trees out of the total 648 trees per ha have their branches cut. This works out to 0.5 % of total trees and 0.7 % of sal trees. No other species in this belt is disturbed. In the bamboo belt healthy regeneration of bamboo culms are due to the selective harvest of matured bamboos. Prohibition of removal of bamboo tendrils leads to greater regeneration. It is noticed that the regenerating bamboo outnumber the harvested bamboos. This indicates that the management practice for bamboo harvesting is sound. This trend is not noticed in the congested bamboos clumps.

In the sample sal plots it is seen that 3 sal trees from 648 trees per ha is with branches cut. No other species in this belt is disturbed. In the Sal bet, this anthropogenic pressure turns out to be only 0.5% of total trees and 0.7% of total sal population. In bamboo belt only one Gamhari tree was chopped off. The anthropogenic pressure in the bamboo belt noticed to be 0.4% of entire tree population. Thus, the strict rule of prohibiting carrying cutting instruments reduce human pressure on it in degrading it.

3. Analysing the population structure otherwise known as the age class of tree species in both belts, the trends of most of the species indicate a normal size class distribution. In general, normal size class distribution means the individuals of younger age should outnumber their succeeding ones. This class distribution ensures maintenance of sustainability in the long run even during the natural catastrophes. The existing forest management system of strict vigil over forest safeguards their regeneration stand which ensures its normal distribution pattern. This deviation is noticed in case of three NTFP yielding species *viz.* Harida, Bahada and Ganjher. Restrictions on Sal, Mahua and Bija trees which was made earlier not to touch these timber yielding species at the onset of the committee. But human pressure on these species although noticed to be low, needs to be strengthened further.

This also indicates:

1. Forest management initiatives taken by Suruguda villagers is successfully regaining the vegetatjon cover. The dominance of Sal trees in the Sal belt and bamboo in the bamboo belt are the signs of successful recovery of upper and understorey species due to proper protection.

2. The management system has taken care of most of the species in the forest. The system also needs to take care of the species that are showing poor regeneration such as Harida, Bahada and Ganjher. The frequency distribution pattern of tree species indicate that most of the species are regaining their vigour safeguarding their regeneration stands.

3. Some important and economic tree species such as Aanla, Dhaula, Jamu, Karanj, Kendu, Kusum Bel, Ganjher, Kantei,and Simuli are about to attain their respective tree size and there has been no pressure on these regenerating stand of these species. This is a healthy sign of proper forest management system that also takes care of these valuable species to recover.

4. Suruguda forest has become a good source of medicinal plants after protection. Shrub species such as Kanmurli (*Holorrahona antidysontorica*) with strong medicinal [illegible] e have revived; other medicinal herbs include Banatulsi, Bhuinaonla, Talmuli etc. The fores[illegible]as also regained shrubs such as Dhatuk, & Khajuri which have considerable NTFP valu[illegible] These species had declined due to stone quarrying before protection started.

Ecology of Baghamunda Forest :

Forest Description:

The forest protected by villagers of Baghmunda lies mostly on hill slope. The forest seems to be pretty young owing to its degradation. The forest primarily consists of not coppices of dominant species such as Sal and its other associated species. Sal is noticed to be dominant as per visual estimation. Population of Sal is predominantly on lower hills alongwith other species. However, as the elevation gradient increases the number of Sal trees correspondingly noticed to be decreasing. Some portion of the Baghamunda forest is exposed with rocks due to erosion. The exposed region of forest is also of considerable area devoid of any vegetation. The slope of hill is stiff. As one move from lower hills to upper hills top, declining of NTFP yielding species. NTFP species include primarily Sal, Char, Mahul, Harida, Bahada etc. Sal trees are noticed to be young having poles size. Matured Sal trees are sparsely noticed. On the other hand, few mahul trees are prominently noticed to be matured which stand undisturbed although the forest has been degraded. Sal, the major crop in the forest is associated with other species such as Mai, Asan, Char, Kendu, Dhaura, Ganjhiari, Mahul, Bheru, Dhubuni, Damghurdi, Kusum, Paladhua, Bahada, Karada, Anchhu, Bhuinkeruha, Girdhini, Kalikendu, Kurdungi, Salhei, Simuli, Sishu, Bhalia, Bija, Sidha and other understoney species (all local names, please refer Annex urefor scientific names).

Baghmunda forest falls under Northern Tropical Dry Deciduous Forest type. Although Sal Population is higher is foothills there has been no clear cut demarcation observed as the forest in Suruguda.

Density of tree species :

As per the vegetation survey in the forest, the Sal is associated with other species as mentioned above. Sal population constitutes roughly 48% of entire forest tree trunks. Sal is followed by Mai (13%) Asan (5-97%), Char (4.09 %), Kendu (3.77%), Dhaura (13.46%), Ganjhiari (3.14%), Mahul (3.14%), Bheru (1.89%), Dhubuni (1.89%), Damghurdi and Kusum 1.26% each. The tree density per ha is given in table . Out of total 26 tree species noticed in the vegetation survey first 12 tree species constitute 90% of entire tree population. Species such as Anchhu, Bhuinkeshuan, Girdhini, Kalikendu, Kurdungli, Salhei, Simuli, Sishu, Bhalia, Bija and Sidha can be regarded as rare species owing to their very lower density and constitutes less than 1% of total tree population.

Regeneration tree species :-

The vegetation survey reveals that a number of tree species are yet to reach their recruitment tree class. They are namely Anla, Banjhan, Barakoli, Baranga, Bel, Bhuinch, Bidang, Bukasungha, Chauli, Gamhari, Ghantuli, Ghurdu, Gutkharaka, Haridam Jamla, Kansa, Kashi, Kumbhi, Kurein, Mundika, Patuli, Samarsungha, Sunari and Tentala (please refer table). However most of the species are noticed to be in very good regeneration stand supplementing their higher recruitment classes (refer charts) . Tree species such as Dhaura are regenerating in a greater number (420 saplings / ha) which is followed by other species.. In most of the cases their further younger members such as seedlings outnumber their sapling class. However tree species such as Dhaura, Gamhari, Kashi, Patuli, Sidha, Mai, Kansa, Sishu, Ghurdu, Bhuincha, Bhalia, Chauli, Kumbhi, Sunari, Bahada, Bija, Harida Samarsungha, Banjhan, Bukasungha, Girdhini, Paladhua, Baranga, Ganjhiari, simuli, Bidang, Jamla and Mundika do not follow the trend and besides Dhaura other species mentioned above. Completely lack seedling regeneration .

Age Class distribution of tree species: -

In any tree population the younger age class individuals should outnumber the elder age members so as to act as a buffer to both natural and anthorpogenic activities. Oftenly although nature adjusts the population, tree population is always susceptible to natural castestrophes of varying degree over its life cycle. Besides natural perturbances, anthropogenic activities exerted by the managing or using community leds to any extreme hazard to the population.

The vegetation survey reveals that in most of the tree species the regeneration stand of some of the species follow the normal class distribution of individuals besides others. They are Mai, Dhaura, Ganjhiari, paladhua, Bahada, Girdhini, Salthei, Simuli, Sishu, Bhalia, Bija & Sidha. The reasons that may be attributed are :

1. Lower regeneration capability of above species
2. Over harvesting of fruits of species such as Bahada, Bhalia etc.
3. Grazing pressure such as cattle tramping etc.

Lacking of such seedling class needs immediate attention and management intervention.

Basal Area, Standing woody Biomass and Mean Annual Increment :-

Calculation of data indicates that Baghamunda forest covers tree trunk baSal area @ 5-125 m^2 / ha and a total of 1025.06 m^2 of entire forest area. The standing woody biomass (SWB) is estimated to be 40.95 tonnes / ha and a total of 8190.54 tonne for entire forest area. The Bahamunda forest grows @ 1.16 tonnes / ha/ yr and a total of 232.6114 tonnes / year.

Anthropogenic pressure on Baghamunda forest:

Although the tree stand of forest seems to be sound, it is not devoid of any anthropogenic pressure. Anthropogenic pressure consists of lopping of branches complete cutting tree trunk etc. Total anthropogenic pressure is estimated to be 2-2% out of which Sal constitute 1.52% an both Mahul, Kendu 0.31% respectively.

Ecology of Talbahali Forest:

Density of trees: -

Since Talbahali forest as a whole represent Northern Tropical Dry Deciduous type, Sal trees constitute the major crop. Vegetation survey in the forest reveals that density of Sal trees is represented by 734 trees / has which constitutes 69% of entire tree population. Sal is followed by Dhaula, Char, Asan, Mahul, Kalam, Kendu, Bada gilari, Bhalia, Anchhu and Gamhari which together constitute 90% of entire tree population. However species such as Chuleigudi, Girdhini, Kantagachha, Matha, Bahada, Bandan, Banpalasha, Daka, Kukudahadi, Kusum, Lakdakana, Simli occur sparsely. Density of each species and their respective % of representation. Species such as Basang, Chuleigudi, Girdhini, Kantagachha, Matha, Bahada, Bandan, Banpalasha, Daka, Kukudahadi, Kusum, Lakdakana, Simli can be considered as rare species owing to their very low % of representation (< 2% altogether) in entire tree population in Talbahali forest.

Tree regeneration: -

Saplings: - As per vegetation survey which reveals that almost all tree species are well supplemented by their respective regeneration stand such as sapling and seedlings. Sal trees are very well supported by Sal sapling which constitute the major number of individuals perha in the Talbahali forest Sal saplings are followed by Kendu, Dhaula, Char and Asan. Some species such as Ambila, Cherbeda, Gilari, Gutkharka, Gambari, Salara and Tentala, Completely lack saplings.

Seedlings:
Similarly seedlings of each tree species mostly supplements their respective sapling and tree recruitments, Kendu has maximum seedlings followed by Gilari, Sal, Char, Asan and Anchhu. Similarly species such as Bandan, Bija, Dhamuni, Geda, Ghanti, Jamu, Kathasiali, Mundi palash, Mundi tilei and Salara lack seedlings completely.

Anthropogenic pressure on forest :-

Vegetation reflects quite quantitatively than visual observation [illegible] eveals that 27 tree species are disturbed (hacked) Vs total 41 tree species existing. The dis[illegible]ed species consist 65-85% of entire population of total 1002 trees / has existing in Talbahali forest 241 trees from different

species have been cut. This is estimated to be 24.05% of total tree population in the forest of all 241 trunks cut Sal represents maximum number of trunks cut. Sal trunks are cut @ 167 tree trunks / ha and it constitutes 69-25% of all tree trunks cut. Dhaula falls next to Sal consisting of 7-38% of total tree trunk cut. Asan follows Dhaula constitutes 4.15% of total cut trunks. As per the survey, any number of trunk of a particular species is cut irrespective any number of individuals existing without assigning any reasons and justifications. Species Daka and Kantagachha are cut 100%. All species showed varied degrees of disturbances. Sal constitutes 23% of trees cut. Most of trees such as Sal are cut for timber requirements and alongwith other species to meet the fuelwood need.

Podu Cultivation Forest Patches :-

Different forest patches left years of fallow land were sampled. Sampling done basically according to three categories, viz. 2 yrs of fallow land, 6 yrs and 10 yrs of fallow land to estimate the recovery of tree species and regeneration stand.

10 year of fallow land:
Density of trees :- Forest land left for 10 years of fallow, 17 tree species are noticed. The survey reveals that Asan and Sal represent maximum % of entire tree population. Both species consist of 63% of entire tree population. Asan alongwith Sal and char constitute 75% of existing population. Tree species such ad Daka, Dhaula, Geda, Harida, Kumbhi, Remini and Sunari each represent 1% of entire tree population.

Regeneration of trees

10 yrs of fallow land is dominated by tree regeneration. Total number of tree species existing is 50 and some of the saplings and higher recruit class has been supported by respective seedlings. In this fallow land, Kendu has highest number of saplings followed by Asan, Sal, Kurchi, Karada etc.. Tree species such as Ambila, Bada gilari, Bahada, Bainku, Bija, Chadeigudi, cherbeda, Dhamuni, Dhema, Dhubunni, Gamhari, Gutkharka, Kantagachha, Khurdu Majah, Mundi Kalam, Munditilei, phenphena, Salara, tilan, Tentala Completely lack saplings .

6 yrs of fallow land :

The analysis indicates tree species prevalent in this fallow land. The species are namely Asan, Bija, Char, Dhaula, Kendu, Kusum, Mahul and Sal. Three species out of above species are dominant. Asan, Kendu and Mahul constitute 75% of entire tree population. Rest constitute only 25%.

Tree regeneration analysis: -
This podu cultivation land is represented by saplings of tree species supported by seedlings of 16 species . Sal Karada, Tilau, Asan, Achhu, Bhalia are regenerating better compared to other tree species.

2 yrs of fallow land :
Mahul, Sal, Char, Asan, Kendu and Bhalia constitute of 75% of entire tree population. Rest 50% of entire species represent 25% of other species.

Tree regeneration:

Regeneration stand of this patch is represented by 16 species of tree spaling and 20 species of seedlings.

Age class distribution of talbahali forest

Uncultivated forest land

Age class distribution of different tree species in Talbahali forest patches reflects a random and abrupt picture. Most of the species in the uncultivated forest land do not follow a normal class distribution pattern which is vital for the species to be sustainable in the long run. Eleven species

out of total 41 in the uncultivated forest land follow normal distribution to a certain extent. These species are namely Anchhu, Anla, Asan, Bahada, Bainku, Char, Chauli, Daka, Dhaula, Gamhari, Harida, kashi, Kusum and Tilau etc. Other species fluctulate from this normal distribution owing to severe human pressure of tree lopping.

Frequency distribution of culture trunks: -

Vegetation survey indicates that most of the tree species are lopped/ hacked irrespective of any age. Almost 95% of the tree species hacked fall in the range of 30 cm to 90 cm GBH. Higher cut tree density are noticed only incase of Sal. Some species are also cut before they develop wood in them.

Age class distribution of tree species in Podu cultivated forest land.:-

10 yrs fallow land :-

Six tree species out of total 17 species existing in the 10 yrs of fallow land has successfully established normal size class distribution ensuring successful sustainability of the species. They are namely Asan, Bhalia, Chauli, Kalam, Karada and Mahul. Rest 11 species have random distribution.

6 yrs of fallow land

Out of total and tree species existing in 6 yrs fallow land of Podu cultivated lands two species Asan and Sal show the sustainability trend. Rest 6 species are showing random distribution:

2 yrs of fallow land :-

2 species namely Sal and Mahul in 2 yrs of fallow land tend to show normal distribution and rest 10 species indicates random distribution. The survey indicates that rest species are cleared and their seedlings are noticed predominantly.

Basal area, SWB & MAI of Froest: -

Basal area, standing woody Biomass and mean annual increment of uncultivated, 10 yrs, 6 yrs & 2 yrs of podu cultivated forest land. BaSal area of uncultivated forest lands remain within 2.61 to 2.77 m^2/ha. Standing woody biomass of uncultivated forest land is 165.95 t/ ha whereas that of podu cultivated lands remains in the range of 20.03 t/ha to 21.41 t/ha. MAI corresponds to their respective SWB and hence uncultivated forest land grow @ 4.71 t/ha/yr, whereas the mean annual increment remains within the range of 0.57 t/ha/yr in 2 years of fallow land to 0.60 t/ha/yr in 10 years of fallow land.

Section - 5:

NTFP Yield Monitoring Of Different Forest Management Systems

Methodology for NTFP yield monitoring

The sample plots used for vegetation analysis were considered for NTFP yield monitoring. The number of trees yielding a particular NTFP were identified with their respective GBH. Average yields of five trees of were considered for yield monitoring.

Data collection and NTFP yield estimation per tree

Data were collected by following steps in sequence:

1. GBH of the trees were noted.
2. Number of primary branches and secondary branches/primary branch were counted. Girth of each primary branch was recorded.
3. Two selective secondary branches were selected per primary branch to count average number NTFPs per secondary branches. It was then estimated for the yield of primary branch. Total yield of the tree (above ground) was estimated by adding all primary branch yields.
4. Average canopy radius was noted to find out average canopy area. Two sampling plots (1m*1m) were laid down under tree canopy to determine fallen NTFP/sq. m. It was then extrapolated to determine fallen NTFP yield per tree canopy.
5. Both NTFPs on the tree and fallen are added to get total NTFP yield (numbers) per tree.
6. Average dry weight of each NTFP sample was determined to convert into weighing units of total NTFP yield.

Total yield NTFP yield in the entire forest

Yield per tree was multiplied with the average sampled area to determine yield/sample plot (plot size 50m*50m) then estimated to yield / ha. Total yield of the forest was extrapolated by multiplying the sample plot yield with total forest area.

YIELD AND PRODUCTION OF NTFP SPECIES: -

Objectives :

1. To estimate the yield and production of different forest management systems
2. To aseess variation in the yield
3. To correlate yield with other parameters such as GBH, height, crown area etc.

Specific selected and rationale :-

Villages / Sites

Village: Gadabanikilo

Sps. monitored	Local name	Component / Plant part	Main use	Secondary use
Madhica Indica	Mahul	Flower	Edible	-
Madhuca Indica	Tol	Seeds	Edible oil extracted	Oil cake as fodder
Buchanania lanzan	Char	Seeds	Fruits edible	-
Emblica officinalis	Anla	Fruits	Medicinal	-
Terminalia Chebula	Harida	Fruits	Medicinal	-
Terminalia belerica	Bahada	Fruits	Medicinal	-
Strychnos nux-vomica	Kochila	Seeds	locally not used	-

Village: Karadapal

Sps. monitored	Local name	Component / Plant part	Main use	Secondary use
Shonea robusta	Sal/ Sargi	Seeds	Seed sold to authorised traders after semi processing	-
Madhica Indica	Mahul	Flower	Edible	Fodder
Madhuca Indica	Tol	Seeds	Edible oil extracted	Oil cake as fodder
Buchanania lanzan	Char	Seeds	Fruits edible	Edible (less)
Emblica officinalis	Anla	Fruits	Medicinal	Eaten raw
Terminalia Chebula	Harida	Fruits	Medicinal	-
Terminalia belerica	Bahada	Gum	Sold for cash	-
Anogeissus latifolia	Dhaula	Gum	Sold for cash	-
	Labah	Gum	Sold for cash	-
	Tilai	Gum	Sold for cash	
Semecarpus anacardicum	Bhalia	Fruits	Edible	-
Semecarpus anacardicum	Bhalia	Nuts	Sold for cash	-

Village Suruguda:

Sps. monitored	Local name	Component / Plant part	Main use	Secondary use
Shonea robusta	Sal/ Sargi	Seeds	Seed sold to authorised traders after semi processing	-
Madhica Indica	Mahul	Flower	Edible	Fodder
Madhuca Indica	Tol	Seeds	Edible oil extracted	Oil cake as fodder
Buchanania lanzan	Char	Seeds	Fruits edible	Edible (less)
Terminalia Chebula	Harida	Fruits	Medicinal	-
Terminalia belerica	Bahada	Gum	Sold for cash	-
Asperagus racemosus	Shatawari	Tubers	Medicinal against gyaecnicological disorders	Tonic as soothing agent
Holorrhena antidysenterica	Kanmurli	Fruits	Locally not used	-
Mushrooms	Chhati	Mushrooms	Edible (delicious dishes made)	Excess sold in village by tribals for cash
Mushrooms	Rugda	Mushrooms	Edible (delicious dishes made)	

Village Baghamunda

Sps. monitored	Local name	Component / Plant part	Main use	Secondary use
Terminalia belerica	Bahada	Fruits	Medicinal	Sold excess in local market

Village Talabahali :

Sps. monitored	Local name	Component / Plant part	Main use	Secondary use
Terminalia Chebula	Harida	Fruits	Medicinal	-
Terminalia belerica	Bahada	Fruits	Medicinal, kernel eaten raw	-
Emblica officinalis	Anla	Fruits	Medicinal	-

Methodology for monitoring yield:

Species	Plant part as NTFP	Method	Season of Monitoring
Madhica Indica	Flower	Quadrat (Record of day to day collection)	March-April
Madhuca Indica	Seeds	Quadrat (total harvest)	April-May
Buchanania lanzan	Seeds	Quadrat (Direct counting)	March-April
Emblica officinalis	Fruits	Quadrat (Direct counting)	Dec-January
Terminalia Chebula	Fruits	Quadrat (Direct counting)	Dec-January
Terminalia belerica	Fruits	Quadrat (Direct counting)	Dec-January
Strychnos nux-vomica	Seeds	Quadrat (Direct counting)	July
Shorea robusta	Gum	Quadrat (After harvesting)	May
Terminalia belerica	Gum	As per peoples' perception	April-May
Anogeissus latifolia	Gum	As per peoples' perception	April-May
Labah	Gum	As per peoples' perception	April-May
Tilai	Gum	As per peoples' perception	April-May
Semecarpus anacardicum	Fruits / nuts	Direct counting	April
Asperqgus racemosus	Tubers	Digging out sample climber and weighing fresh	June-July
Holorrhena antidysenterica	Fruits (fresh)	Direct counting	January
Mushrooms	Entire sporophyte	Fresh weighing (per sq.m)	July
Mushrooms	Entire sporophyte	Fresh weighing (per sq.m)	July

Years of Monitoring :

		Year		
Site(s) / Village	Species	1999	2000	2001
Gadabanikilo	*Maduca indica*	✓	✓	
	Buchanania lanzan	✓	✓	
	Emblica officinalis	✓	✓	✓
	Terminalia Chebula	✓	✓	✓
	Terminalia belerica	✓	✓	✓
	Strychnos nux-vomica	✓	✓	
Karadapal	*Maduca indica*	✓	✓	
	Buchanania lanzan	✓	✓	
	Emblica officinalis	✓	✓	
	Shorea robusta	✓	✓	
	Terminalia Chebula	✓	✓	
	Terminalia belerica	✓	✓	
	Terminalia belerica(gum)	✓		
	Dhaula(gum)	✓		
	Labah(gum)	✓		
	Tilai(gum)	✓		

Suruguda	*Shorea robusta* *Maduca indica* *Buchanania lanzan* *Terminalia Chebula* *Terminalia belerica* *Asperqgus racemosus* *Holorrhena antidysenterica* *Mushrooms*		✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	
Baghamunda	*Terminalia belerica*			✓
Talbahali	*Terminalia Chebula* *Terminalia belerica* *Emblica officinalis*			✓ ✓ ✓

Sample size and GBH

Sites / Village	*Species*	No. of trees/plants belonging to different GBH								
		30-50	51-70	71-90	91-110	111-130	131-150	151-170	171-190	191-210
Gadaban ikilo	*Maduca indica*	5	5	5	5					
	Madhuca indica (seeds)	5	5	5	5					
	Buchanania lanzan	5	5	5						
	Emblica officinalis	2	2	2						
	Terminalia Chebula	2	2	2						
	Terminalia belerica	3	3	2						
	Strychnos nux-vomica	3	2	2						
Karadapal										
	Shorea robusta	5	5	5	5	5	5	5	5	5
	Buchanania lanzan	2	2	2	2	1				
	Emblica officinalis	2	2	2	2	1				
	Terminalia Chebula	3	2	2						
	Terminalia belerica	1								
	Terminalia belerica(gum)			2	2					
	Maduca indica				3					
	Madhuca indica(seeds)	1	1	1						
	Dhaula	1	1	1						
	abah			1						
	iali	1	1	1						

	Semecarpus anacardium	*1*	1	3						
Suruguda										
	Shorea robusta	*5*	5	5						
	Maduca indica	*2*								
	Madhuca indica(seeds)	*2*								
	Buchanania lanzan	*3*	2	2						
	Terminalia Chebula	*2*								
	Terminalia belerica	*3*	3	1						
	Acorus. racemosus	*5 Climber choosen*								
	Holorrhena antidysenterica	*3 individuals choosen*								
	Mushroom	*2 sq.m choosen for data collection*								
Baghamunda										
	Terminalia belerica		2							
Talbahali	*Terminalia chebula*	*2*								
	Terminalia belerica		1							
	Emblica officinalis	*1*								

Mean yield of NTFPs and Standard deviation :
Site : **Gadabanikilo**

Species	GBH class	No of trees monitored	Year(s) monitored	Mean Yield (Kgs / tree)	Standard
Madhuca Indica (flower)	30 - 50	5	1999	8.17	0.6936
		5	2000	7.05	0.2423
	51-70	5	1999	8.70	1.5183
			2000	[illegible]	1.17862
	71-90	[illegible]	1999	[illegible]	0.0397
		[illegible]	2000	[illegible]	1.8393

	91-110	5 5	1999 2000	11.95 10.16	0.9465 1.3622
Madhuca Indica (seeds)	30-50	5 5	1999 2000	2.24 2.05	0.2016 0.0758
	51-70	5 5	1999 2000	2.67 2.80	0.1093 0.0386
	71-90	5 5	1999 2000	3.45 3.93	0.03092 0.2043
	91-110	5 5	1999 2000	4.56 4.57	0.1817 0.2093
Buchanani a lanzan	30-50	5 5	1999 2000	0.52 0.54	0.0045 0.0123
	51-70	5 5	1999 2000	0.79 0.70	0.0095 0.0047
	71-90	5 5	1999 2000	0.92 1.04	0.0054 0.0754
Emblica officinalis * the yield assessmen t could not done due to super cyclone during flowering season	30-50	2 2 2	1999 2000 2001	17.23 * 13.44	0.06076 * 3.5532
	51-70	2 2 2	1999 2000 2001	22.35 * 18.58	10.3041 * 8.8804
	71-90	2 2 2	1999 2000 2001	38.012 * 34.0650	5.6264 * 1.4042
Terminalia chebula * the yield assessmen t could not done due to super cyclone during flowering season	30-50	2 2 2	1999 2000 2001	17.85 * 14.4150	0.5113 * 3.3672
	51-70	2 2 2	1999 2000 2001	21.60 * 17.1650	0.0100 * 2.2052
	71-90	2 2 2	1999 2000 2001	22.25 * 21.11	1.7161 * 2.3716
Terminalia belerica * the yield assessmen t could not done due to super cyclone during flowering	30-50	3 3 3	1999 2000 2001	31.88 * 28.36	6.0458 * 13.80
	51-70	3 3 3	1999 2000 2001	32.65 * 30.49	0.4842 * 0.4540
	71-90	2 2 2	1999 2000 2001	34.47 * 33.27	2.3405 * 2.5704

season					
Strychnos nux-vomica	30-50	3	1999	15.19	0.9539
		3	2000	13.2600	0.9661
		2	1999	33.08	0.0157
	51-70	2	2000	30.88	0.4290
	71-90	2	1999	47.73	0.6561
		2	2000	40.99	1.8632

Village Karadapal

Species	GBH class	No. of trees monitored	Year(s) monitored	Mean Yield (Kgs / tree)	Standard deviation
Shorea robusta	30-50	5	1999	5.26	1.0215
		5	2000	4.778	0.4282
	51-70	5	1999	6.5	0.2012
		5	2000	6.448	0.2849
	71-90	5	1999	9.25	0.9295
		5	2000	8.656	1.9377
	91-110	5	1999	9.88	0.7771
		5	2000	10.556	2.4508
	111-130	5	1999	15.47	2.6277
		5	2000	15.782	1.9276
	131-150	5	1999	25.47	6.3794
		5	2000	24.942	7.0361
	151-170	5	1999	30.22	12.0083
		5	2000	29.726	10.2232
	171-190	5	1999	32.44	18.1566
		5	2000	34.02	5.9342
	191-210	5	1999	33.25	35.7396
		5	2000	35.66	27.7612
Madhuca indica (flower)	30-50	2	1999	23.35	0.1521
		2	2000	25.56	0.6241
	51-70	2	1999	25.6	0.0729
		2	2000	26.96	0.0064
	71-90	2	1999	28.86	0.4761
		2	2000	27.63	1.5876
	91-110	2	1999	39.56	0.8281
		2	2000	44.28	2.5600
	111-130	1	1999	4.55	0.0000
		1	2000	44.66	0.0000
Madhuca indica (seeds)	30-50	2	1999	27.105	2.1170
		2	2000	23.465	10.0172
	51-70	2	1999	37.165	2.3256

		2	2000	31.37	20.1601
	71-90	2	1999	41.16	1.4400
		2	2000	44.455	1.5006
	91-110	2	1999	59.93	13.0321
		2	2000	59.51	1.3225
	111-130	1	1999	65.56	0.0000
		1	2000		0.0000
Buchanania lanzan	30-50	3	1999	0.68	0.0067
		3	2000	0.75	0.0173
	51-70	2	1999	0.87	0.0010
		2	2000	0.85	0.0049
	71-90	2	1999	0.98	0.0007
		2	2000	0.89	0.0049
Emblica officinalis	30-50	1	1999	10.00	0.0000
		1	2000	5.6	0.0000
Terminalia chebula	71-190	2	1999	69.00	16.00
		2	2000	36.5	13.50
	91-110	2	1999	81.00	16.00
		2	2000	39.475	9.1506
Terminalia belerica (fruits)	91-110	3	1999	250.00	1766.00
		3	2000	81.34	36.3334
Terminalia belerica (gum)	30-50	1	1999	8.00	0.00
	51-70	1	1999	10.00	0.00
	71-90	1	1999	12.00	0.00
Dhaula gum	30-50	1	1999	3.5	0.00
	51-70	1	1999	5.0	0.00
	71-90	1	1999	7.5	0.00
Labah (gum)	71-90	1	1999	60.00	0.00
Tiali (gum)	30-50	1	1999	15.00	0.000
	51-70	1	1999	35.00	0.000
	71-90	1	1999	40.00	0.000
S.anacardium	30-50	1	1999	41.00	0.000
		1	2000	37.00	0.000
	51-70	1	1999	57.00	0.000
		1	2000	56.00	0.000
	71-90	3	1999	64.00	34.6667
		3	2000	52.00	32.0470

Section - 6:

Annexures

Village Suruguda :

Species	GBH class	No of trees monitored	Year(s) monitored	Mean Yield (Kgs / tree)	Standard deviation
Shorea robusta	30-50	5	2000	5.056	0.9521
	51-70	5	2000	6.876	0.0618
	71-90	5	2000	8.836	0.5444
Madhuca indica (flowers)	30-50	2	2000	23.97	2.6407
Madhuca indica (seeds)	30-50	2	2000	14.595	1.1130
Buchanania lanzan	30-50	3	2000	0.44	0.0128
	51-70	2	2000	0.54	0.0750
	71-90	2	2000	0.60	0.0930
Terminalia chebula	30-50	2	2000	13.85	2.2053
Terminalia belerica	30-50	3	2000	13.06	1.774
	51-70	3	2000	16.75	1.5221
	71-90	1	2000	42.25	0.000
Acorus racemosus		Climbers- 5	2000	0.304 (fresh water)	0.9442
Holorrhena antidysenterica		No. of shrubs- 3	2000	0.56 (fresh water)	0.9442
Mushroom Chhati			2000	1.175 (fresh water)	1.3837
Rugda			2000	0.615(fresh water)	0.3803

Village Talbahali :

Species	GBH class	No. of trees monitored	Year(s) monitored	Mean Yield (Kgs / tree)	Standard deviation
Terminalia chebula	30-50	2	2001	15.695	4.6440
Terminalia belerica	51-70	1	2001	16.55	0.0000
Emblica officinalis	30-50	2	2001	6.94	0.0841

Annexure 1
CHECK LIST FOR GENERAL SITE CHARACTERISTICS:

Name of the forest:

Type of forest:

Status of the forest (RF/VF/PF/Any other):

Forest profile: Forest range:
Circle:
Forest division:
Area of the forest:

% of vegetation cover: % of fround cover:

Sign of cattle tramping? Presence of cow dung/goat pellets?

Terrain (slopy, stiff, flat/ any other):

Slope of the hill:

Direction of hill:

Soil characteristics:

Wild animals present:

Any other specific characteristics?

FORMATS FOR ECOLOGICAL ASSESSMENT OF FORESTS

Table a: Format for vegetation assessment.

Date: Site: Investigating team: Land type: Method:
Tree quadrant villagers: plot no: Plot
size:

Sl no	Tree species	GBH (in cm)					Appx ht (in m.)	Avg canopy diam (m)	Phenological characteristics	Climber (s) on it	Anthropol ogical sign
		1	2	3	4	5					
1											
2											
3											
4											
5..											

Table b: Format for tree regeneration assessment

Date of study: Site: Sample plot no:
Plot size:

Tree quadrant

Sl no	Tree species	No. of saplings	No of seedli
1			
2			

3			
4			
5...			

Table c: Format for shrub density measurement

Date of study: Site: Sample plot no:
Plot size:

Shrub quadrant

Sl no.	Shrub species	Bunch no.	No of sticks	Avg canopy diam. (in m.)
1				
2				
3				
4				
5...				

Table d: Format for herb density measurement.

Herb quadrant

Sl no	Herb species	Number of herbs
1		
2		
3		
4		
5...		

Table e: Format for canopy status studies.

Date of study:
Investigating team:
Participating villagers:

Site:
Sample plot no:
Method: Line transect method

Land type:
Plot size:

Points	No canopy (0-20%)	Adjacent crowns (40%)	Crown overlap sky still visible (80%)	Sky not visible (100 %)
1				
2				
3				
4				
5...				
Frequency				

Table e: Format for use pattern of tree species.

Sl no	Tree species	Used for
1		
2		
3		
4		
5...		

Table f: Format for use pattern of shrub species

Sl no	Shrub species	Used for
1		
2		
3		

4		
5...		

Table g: Format for use pattern of herb species

Sl no.	Herb species	Used for
1		
2		
3		
4		
5...		

Table h: Format for collection, consumption and selling of NTFPs

Sl no	NTFP Species	Collection of NTFPs				Qty consumed	Qty sold	Sold @? / kg
		Collected ?(✓)	Regular	Random	Qty/yr.			
1								
2								
3								
4								
5..								

Table i: Format for NTFP yield of tree species (per quadrat)

Sl no	NTFP tree sps	Parts as NTFP			GBH class	Mean GBH	No of indiv.	NTFP yield (kgs.)/indiv.			Total yield		
		1	2	3				1	2	3	1	2	3
1													
2													
3													
4													
5..													
Root: R, Tuber: Tb, Bark: (Shoot bark)Sb/ Root bark (Rb), Twig: Tg, Leaves: L, Flower : Fl, Fruits : Fr, Seeds: S, Others : O													

Table j: Format for NTFP yield from shrub species

Sl no	Shrub species	Parts as NTFP			Sticks class	Mean stick no	No. of Individuals.	Avg NTFP item/stick			Total NTFP item		
		1	2	3				1	2	3	1	2	3
1													
2													
3													
4													
5...													
Root:R, Tuber: Tb, Bark: Sb/Rb, Twig: Tg, Leave: L, Flower : Fl, Fruits : Fr, Seeds: S, Others : O													

Table k: Format for NTFP yield from herb species

Sl no	NTFP herb species	Parts as NTFP			NTFP item (by gms.)/ sq m.		
		1	2	3	1	2	3
1							
2							
3							
4							
5..							

Format for NTFP yield monitoring: trees

Tree sps: Approx ht: Mean Canopy Radius:

Table I:

For NTFP items above the ground

Primary Branches	Girth (in cm)	No of sec Branches	Mean NTFP item/sec. Branch			NTFP item / prim.Branch		
			1	2	3	1	2	3
P1								
P2								
P3								
P4								
P5...								
NTFP (Root, tuber, stem, stem/root bark, leaf, flower, fruit, seed, any other)								

For fallen NTFP items (under canopy)

Plot size: 1m * 1m = 1 sq m

Sample plot no.	No of fallen NTFP		
	1	2	3
Sp1			
Sp2			

NTFP item			Mean wt		
1	2	3	1	2	3

List of plants with respective scientific names.

Sl No	Local Name	Scientific Name
1	Acacia	*Acacia nilotica*
2	Achhu	*Morinda tinctoria*
3	Amba	*Mangifera indica*
4	Ankukoli	*Alangium hexapetalum*
5	Ankula	*Alangium lamarckii*
6	Aanla	*Emblica officinalis*
7	Asan	*Terminalia tomentosa*
8	Atundi-Lai	*Combretum decandrumm*
9	Bahada	*Terminalia bellerica*
10	Baidhanka	*Mucuna monosperma*
11	Bajramuli	*Sida species*
12	Banamalli	*Millingtonia hortensis*
13	Baula	*Mimusops elengi*
14	Baunsa-salia	*Dendrocalamus strictus*
15	Baunsa-Balangi	*Oxytenenanthera gigantia*
16	Baunsa-sundarakani	*Bambusa vulgaris*
17	Bela	*Aegle marmelos*
18	Bhaincha	*Flacourtia sepiaria*
19	Bhalia	*Semecarpus anacardium*
20	Bhuinlimba	*Andrographis paniculata*
21	Bichhuati	*Tragia involucrata*
22	Bisalyakarani	*Tridax procumbens*
23	Chadheigoda	*Vitax pedancularis*
24	Chara	*Buchanania lanzan*
25	Daba Baunsa	*Bambusa arundinacea*
26	Dahidahikia_nati	*Tinospora malabarica*
27	Duba - ghasa	*Cynodon doctylon*
28	Eucalyptus	*Eucalypus species*
29	Gamvhari	*Gmelina arborea*
30	Gayasa	*Leucas species*
31	Ghodalanjia	*Albizzia species*
32	Gila	*Caesalpinia decapetala*
33	Giringa	*Pterospermum heyneanum*
34	Gohira	*Acacia leucocephala*
35	Guakoli	*Maba buxifolia*
36	Halada	*Adina cordifolia*
37	Harida	*Terminalia chebula*
38	Hatilai	*Heliotropicum indicum*
39	Jamu	*Syzygium cumini*
40	Jari	*Ficus retusa*
41	Jhumpuri	*Streblus taxoides*
42	Kaincha	*Abrus precatorius*
43	Kalachua	*Diospyros sylvatica*
44	Kanasa	*Hymenodyctylon excelsum*
45	Kanta Baunsa	*Bambusa arundinacea*
46	Kanteikoli	*Zizyphus oenoplia*
47	Kapasia	*Kydia calycina*
48	Karaba	*Dioscorea pentaphylla*
49	Kasi	*Bridellia retusa*
50	Kendu	*Diospyros melanoxylon*
51	Kerhuan	*Hollarhena antidysenterica*

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52	Khair	*Acacia catechu*
53	Khajuri	*Phoenix sylvestris*
54	Khirakoli	*Carissa spinarum*
55	Kochila	*Strychnos nuxvomica*
56	Kumbhi	*Careya arborea*
57	Kusum	*Schleira oleosa*
58	Lajakuli	*Mimosa pudica*
59	Lunikoli	*Solanum nigrum*
60	Mahanimba	*Melia composita*
61	Mahi	*Lannea coromandalica*
62	Mahula	*Madhuca longifolia*
63	Matikinia	*Mitragyna parviflora*
64	Morhian	*Zanthoxylum budraga*
65	Muturi	*Smilax macrophylla*
66	Narigini	*Atalantia monophylla*
67	Neem	*Azadirachta indica*
68	Nirmuli	*Cuscuta reflexa*
69	Osta	*Ficus religiosa*
70	Patuli	*Lagerstroemia reginae*
71	Piasal	*Pterocarpus marsupium*
72	Saguan	*Tectona grandis*
73	Sahada	*Streblus asper*
74	Sal	*Shorea robusta*
75	Sidha	*Lagerstroemia parviflora*
76	Sunari	*Cassia fistula*
77	Tentuli	*Tamarindus indica*
78	Tinia	*Albizzia odoratisima*

Section - 7:

Plates

Estimation of production of selected NTFPs in the selected forest patches

Sites / villages			Year-1999		Year-2000		Year-2001			Total yield (in t)		
Gadabanikillo	Species	trees/ Ha	Mean yield / tree	Standard deviation	Mean yield / tree	Standard deviation	Mean yield / tress	Standard deviation	Forest area (in ha)	1999	2000	2001
	Madhuca indica (flower)	76	8.0000	6.5585	7.1312	4.8590			142	86.3360	76.9599	
	Madhuca indica (seeds)	76	2.5840	1.1951	2.6744	1.4029			142	27.8865	28.8621	
	Buchanania lanzan	46	0.7487	0.0284	0.7640	0.0437			142	4.8903	4.9904	
	Emblica officinalis	5	25.8640	78.1560			22.0300	76.8153	142	18.3634		15.6413
	Terminalia Chebula	11	20.5667	3.7606			17.5633	7.5498	142	32.1251		27.4339
	Terminalia belerica	10	33.0000	1.1793			30.7111	4.0472	142	46.8600		43.6098
	Strychnos nux-vomica	8	32.0000	177.0585	28.3800	131.3426			142	36.3520	32.2397	
Karadapal	*Shorea robusta*	350	18.6711	121.1310	18.952	133.5514			12,060	78,810.7600	79,996.3920	
	Maduca indica (flower)	16	32.1840	63.2058	33.818	76.1041			12,060	6,210.2246	6,525.5213	
	Madhuca indica(seeds)	16	46.1840	206.9946	45.1800	269.7237			12,060	8,911.6646	8,717.9328	
	Buchanania lanzan	17	0.8433	0.0154	0.8300	0.0035			12,060	172.9002	170.1666	
	Emblica officinalis	1	10.0000	0.0000	5.6	0.0000			12,060	120.6000	67.5360	
	Terminalia Chebula	5	75.0000	36.0000	81.34	0.0000			12,060	4,522.5000	4,904.8020	
	Terminalia belerica	5	250	0.0000	37.9875	2.2127			12,060	15,075.0000	2,290.6463	
	Terminalia belerica(gum)	6	10.0000	0.0154					12,060	723.6000		
	Anogeissus latifolia	25	5.3333	0.0154					12,060	1,608.0000		
	Labah	1	60	0.0000					12,060	723.6000		
	Tiali	5	30.0000	116.6667					12,060	1,809.0000		
	Semecarpus anacardium	5	54.0000	92.6667	54.0000	99.0000			12,060	3,256.2000	3,256.2000	
Suruguda	*Shorea robusta*	311			6.9227	2.3825			80		172.2359	
	Maduca indica (flower)	2			23.9700	0.0000			80		3.8352	
	Madhuca indica(seeds)	2			14595	0.0000			80		2.3352	
	Buchanania lanzan	6			0.53	0.0044			80		0.2544	
	Terminalia Chebula	2			13.8500	0.0000			80		2.2160	
	Terminalia belerica	7			24.021	168.4114			80		13.4518	
	Asperagus racemosus	350			0.304	0.9442			80		8.5120	
	Holorrhena antidysenter	700			0.5600	0.9442			80		31.3600	
	Chhati				1.1750	1.3837			80			
	Rugda				0.6150	0.3803			80			
Baghmunda	*Terminalia belerica*	3					12.4500	0.3136	200			7.4700
Talbahali	*Emblica officinalis*	5					6.9400	0.0841	564			19.5850
	Terminalia chebula	2					15.6950	4.6441	564			17.7168
	Terminalia belerica	1					16.5500	0.0000	564			9.3410

Plate- 23 : Gadabanikilo : A cartload of clearing output (used for fuelwood purposes)

Plate- 21 : Shri S. Palit, Ex CCF, West Bengal in a deep interaction with Vasundhara staff (Gadabanikilo cleared patch)

Plate- 22 :Gadabanikilo: Ripen Fruits of Terminalia Chebula lying in forest floor

Plate-19:Gadabanikilo: Youths active in dense forest

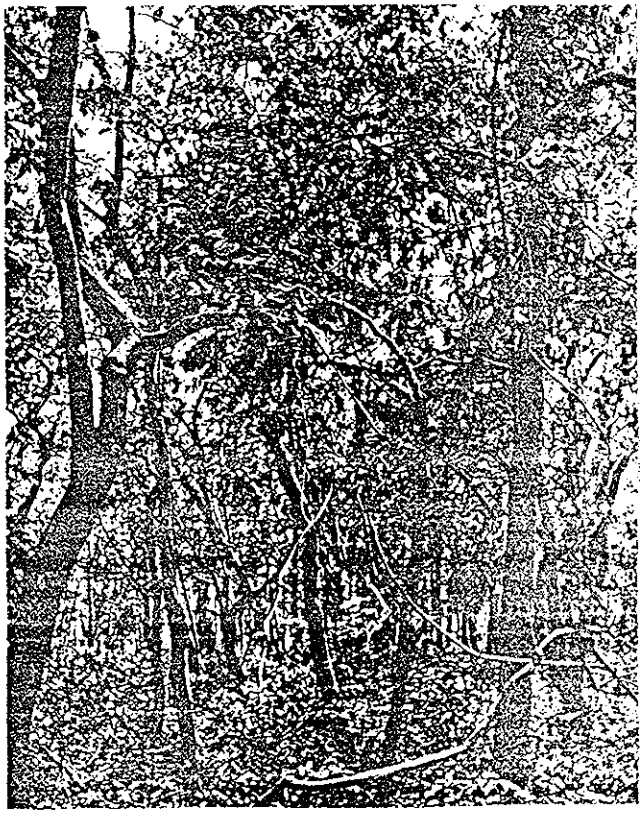

Plate- 20 : Gadabanikilo : Freshly cleaned forest Patch

Plate-17 : Talbahali : Two years of cultivated land in broader view

Plate-18:Talbahali: Freshly cleared forest patch used for paddy cultivation

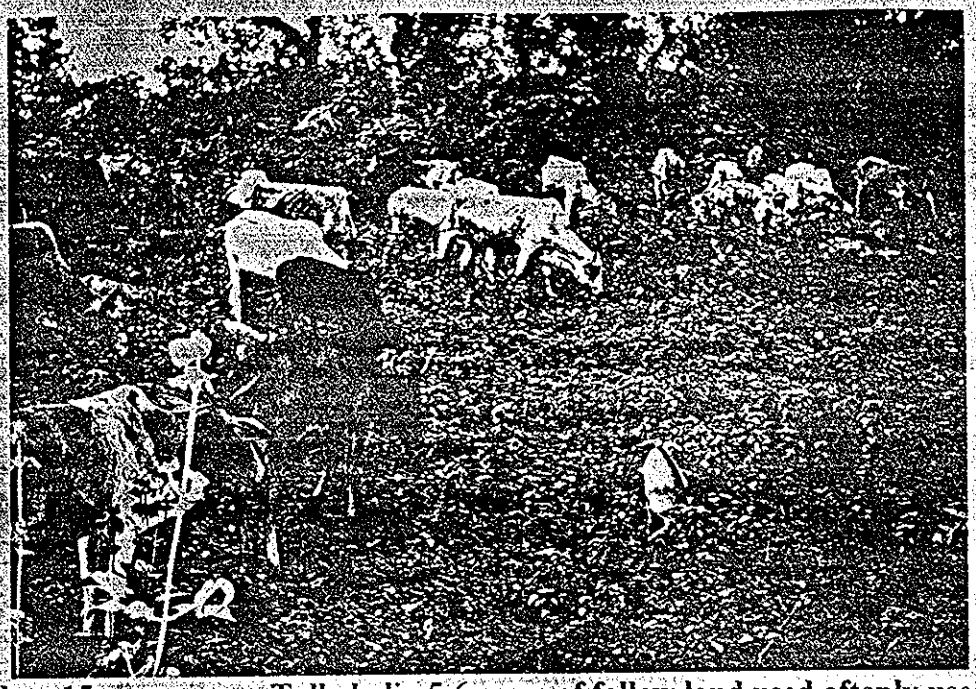

Plate-15 : Talbahali : 5-6 years of fallow land used oftenly used for grazing

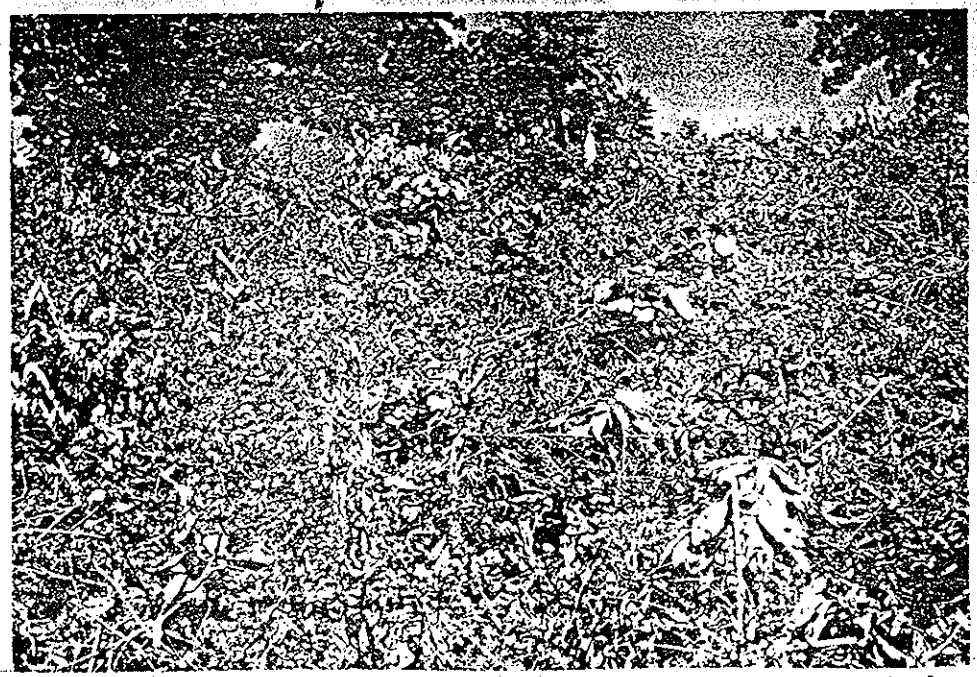

Plate-16 : Talbahali: Two year fallow land cultivated for blackgram.

Plate-13 : Baghamunda: Local vidya traditionally collecting seeds of Gutkharka (local name)

Plate-14 : Talbahali : Cut stumps frequently noticed in uncultivated forest patch

Plate-7: Suruguda : Shri Man Bhula Sa, Ex - President, Suruguda VSS, holding the Indira Gandhi Brukshya Mitra Award

Plate-8: Suruguda: *Holorrhena antidysentirica*

Plate-5: Suruguda: Social Forestry Plantations

Plate-6: Suruguda : village youth monitoring vegetation (Social ForestryPlantations)

Plate -3 :

Plate - 4 Suruguda village meeting

Plate - 1 : Vast Karadapal Reserve Forest (Atei R.F)

Plate- 2 : Karadapal : A youth marking trees after the plot being monitored.