

Latest Scenario of Forest Ecosystem In Lalgarh of Jhargram District For Community Development In West Bengal, India

Dr. Debabrata Das

Ecology Laboratory, Department of Botany
Lalgarh Government College, Lalgarh, Jhargram, West Bengal, 721 516, India

Abstract- Ecological studies on some strata of vegetation have been done under varied microclimate in Jhargram District (Formerly in Paschim Medinipur District of West Bengal). It deals with the first canopy layer of dominant tree species like sal (*Shorea robusta*) and its associates for composite vegetation admixed with a few tree species available in the second canopy covering elements with a less to lesser number of ground vegetation during winter followed by summer. During monsoon the heterogeneity was found maximum followed by post monsoon. A less number of shrubs and woody climbers were found in the forest during monsoon that makes the canopy thicker in compare to the other study sites in the same jungle. Maximum plant species found in the forest was medicinal including edible fruit making plants where as other species were found as forage but all have their ecological status. The present study includes some Non Timber Forest Produces (NTFPs) which are used widely by the forest fringe people of Lalgarh with potential significance and their management to conserve the forest in near future.

Keywords- Lalgarh, Forest Resource-NTFPs, Ecological status and Eco-restoration.

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I. INTRODUCTION

Lalgarh is famous globally due to Maoist movement date back to a few years. Geographically it is a popular location along the basin of Kansai (Kanswabati River) flows towards the lower tract of Medinipur and nurturing a great geographical race with undulated land profile having riverian soil encouraging heavy production of green vegetables but other hand a patchy forest and degraded land filled with robust natural sal (*Shorea robusta*) vegetation along with plantation done by Eucalyptus, Acacias and Cashew. It is now falls under Binpur-I Community Development Block of Jhargram District, West Bengal. Overall geographical territory broadcasts agricultural land, shrubberies, fallow land and forests. But the forest is coppice sal under deciduous type admixed with other plant elements enriched the vegetation

during monsoon to late monsoon. During summer the forest become ground vegetation less as the ground fire ruined almost all as a common practice made unknowingly in the area. The site where no ground fire, a few number of ground vegetation have been observed with a lesser number of dry woody shrubby climbers.

According to the re-naming of forest divisions (2008) it is now under Lalgarh-Jhitka forest range and is situated under the jurisdiction of Midnapur Forest division in West Bengal. It is situated along the metallic road Bhadutala-Midnapore to Lalgarh under West Bengal State of India (Map 1).

The forest is coppice sal (*Shorea robusta*) with other trees and shrubs scattered in distribution even the unnatural site having some plantation species created by Forest department (FD). Other species found in the forest are sal associates like *Terminalia arjuna*, *Terminalia crenulata*, *Madhuca indica*, *Pterocarpus marsupium*, *Terminalia bellerica*, *Terminalia chebula*, *Bombax ceiba*, *Schleichera oleosa*, *Diospyros sylvatica*, *Diospyros exculpta*, *Carya arborea*, *Anogeissus latifolia*, etc. Plantation sites are covered by a large number of *Eucalyptus* hybrids, *Acacia auriculiformis*, *A. mangium*, *Anacardium occidentale*, *Cassia siamea*, *Bambusa* spp. and *Tectona grandis*. According to the report of forest department the area is covered with 60% natural sal and other covered with plantation species, scrub jungles and bushes of natural kind. According to Champian and Seth's classification the forest is a type under major group-II, dry tropical forests group-5, tropical dry deciduous forest, sub-group-5 (b) Northern tropical dry deciduous forest (c) (i) dry sal bearing forest (c) (ii) dry peninsular sal forests. Non continuous forest patches have been observed from one corner to another along with alternate cultivated undulated land and waste land as a group of habitation. According to the report of forest department, there was no significant report of wild fauna but some report revealed scare fauna in this forest area. These are civet, wild boar, jungle cat, hare, baboon, python, etc. So many avifaunas (birds) are available here (Das and Das, 2016, Das, 2016, Das and Das, 2017). Snakes of venomous and non venomous are common. Venomous snakes like Cobra, Krait, Banded Krait, Vipers etc. are present here. Residential availability of wild elephants are frequently found

in the jungle but during July to late February large number of elephant are migrated from Dalma hills of Jharkhand to the Bankura forest through this region and move vice versa. The heterogeneous movement from forest to jungle to cultivated land create a great problem of this region. The common man-wild elephant conflict is a common phenomenon of this area though forest department and forest protection committees are

willing to postpone the destructive activities by registering the phone number of the local people and sending message in every moment to locate the present position of elephant round the year. They engaged to show vivid presentation in Banabandhab mela at different areas of the state.



Map. 1 Lalgarh in Paschim Medinipur Distroict, West Bengal, India (Source: www)

The conservation of biological resource as well as environment is an urgent issue because in the last few decades the well being of natural resource has been diminishing due to illegal use of land and use pattern of settlement due to heavy pressure of local people in and around the forest. The deforestation and land degradation is another cereous cause to loss of bio-resource which could be a threat to flora and fauna as a whole. Even in protected forests, the anthropogenic effects from newly expanding villages such as harvesting of NTFPs, cattle and similar wild animal grazing and browsing of some domestics cause the loss of resource day by day. The gradual effect of global warming and deficit of rainy days throughout the year in the said zone cause loss of productivity in agricultural as well as in forested land threatens the ecological processes. The similar activities made by some workers worked in Thailand which emphasised on the modification of environment by anthropogenic activities which loss the forest floor vegetation by settlement of villages and forest fire including huge collection of medicinal plants, grazing and browsing of domesticate animals (Popradit *et al.* 2015). In west Bengal the same pattern has been increasingly posed due to different activities made by villagers in the forested area. But the work has been done by a few workers truly in the wide span of the state. Vegetation structure of different strata (tree, shrub and herb) were analysed in Garhjungle sacred forest of lateritic zone in West Bengal at Birbhum District of southwest Bengal (Ganguli *et al.* 2016). But the theme is that in our Lalgarh Forest patch, no longer similar work have been made till date to determine the pattern of vegetation though some

cryptic work on different aspects in the study site have been made time to time. Ecologically it is interesting because natural vegetation, plantation stand and degraded land vegetation available better here which may be resource line to study the pattern of degradation hitherto to determine the eco-degradation process that constantly hampering the normal process of succession. Therefore, the present studies have been taken in to account as on the basis of natural resource management to make the ecosystem protected and make it pristine.

II. MATERIALS AND METHODS

Extensive field visits were carried out to different places of the study site which falls in Between Binpur-II and Salboni block of Paschim Medinipur District, West Bengal. The study site having different zones, like grass land, forest, degraded land, cultivated land, rice fallow land, highland, ponds, creaks, canals and low lying land which have been taken for vegetation association studies. The entire lateritic belt has a plantation of *Acacia* sp. and *Eucalyptus* mixed with Cashew Nut (*Anacardium* sp.). So, the sites with low fluctuations and high eco-niche have been omitted to avoid the biasness of the data. The quadrats as well as transects were taken for monitoring vegetation in late monsoon, and in winter as per the latest ecological methods. Monitoring and eco-restoration study was done following the concept of Greipsson (2011). Parameter taken for stability study and concept of structure and function of elements in ecosystem along with

dynamics of vegetation idea of Dash and Dash (2010), Das (2014, 2016) were taken. The management of the policymaker and similar managerial system was taken from internet to get idea regarding the present day scenario of *sal* dominated forest in lateritic southwest Bengal. Books, Journals, periodicals and magazine including registers of different departments were also consulted for literature study. Interviews and cross references were studied using Participatory Rural Appraisal (PRA) technique in field. Plant specimens from field were also collected and processed for presentation as herbarium specimens and for identification using botanical and ecological standard. Specimens were carefully studied, critically examined and cross checked with the specimens housed in different herbaria. For conformity of specimens, local floras were consulted (Prain, Vol-I-II, 1963; Haine, Vol-I-III, 1921, Hooker, 1892-1897). To consult some publications, Taxonomy and similar research papers from website have been downloaded and followed by Das (2013) and Das and Das (2014, 2016). Some books published by West Bengal Forest Directorate, Research Wing (2005, 2010) have also been consulted to analyze the report along with our collections that the plants are either medicinally important or economically important. Methodology used for abundance study followed by Groom *et al.*, (2006) along with the thesis of Das (2007) and project work of Das (2009, 2015). Relevant literature have been collected and consulted for the preparation of the manuscript. The voucher specimens were housed in departmental herbarium, Ecology Laboratory of Lalgarh Govt. College, Lalgarh, Paschim Medinipur West

Bengal for future study and as record.

III. RESULTS AND DISCUSSION

Forest is a natural site that has multi-layered tree species with multifunctional role to develop ecosystem eco-friendly. Firstly, it is a natural habitat for plants and animals which is locally fit for in-borne and locally hosted species. Secondly, it harbours some exotic and alliance species of foreign origin. Thirdly, it is an interactive zone between two separate eco-zones *i.e.* manmade environment and natural environment. Ecosystem of well established self supported environment is ruined by exotic forces day by day which hampered the true pristine ecosystem (Das, 2016). Therefore, a multi-facial element in the natural environment is essential which have different elements of flora govern the flow of economy to the community by different means. So, strata level differentiations have been presented in different tables (Table 1, 2, 3 and 4) that have a key role to develop the community structures of Lalgarh Forest Ecosystem.

Medicinal Plants are the important bio-resource till date directly for local use. Important medicinal plants available in this forest area are *Aegle marmelos*, *Curculigo orchioides*, *Azadirachta indica*, *Aristolochia indica*, *Ichnocarpus frutescens*, *Elephantopus scaber*, *Hemidesmus indicus* etc. (Table 1).

Table 1. Medicinal Plants used widely in the forest area of Lalgarh, Jhargram, West Bengal.

| NAME | FAMILY | MEDICINAL USES OF PLANTS/PRODUCTS |
|--|------------------|--|
| <i>Aegle marmelos</i> Corr. (Beng.-Bel) | Rutaceae | Fruit pulp is used in Chronic diarrhoea, dysentery. Half ripe fruit is used as an astringent, digestive, stomachic and in diarrhea. |
| <i>Amorphophalus sylvaticus</i> (Roxb.) Kunth. (Beng. -Ban oal) | Araceae | Toothache, swellings etc. |
| <i>Aristolochia indica</i> L. (Beng.-Iswarmul) | Aristolochiaceae | Juice with honey used against leucoderma, used against fever, arthritis and bowel complaints |
| <i>Azadirachta indica</i> Adr. Juss. (Beng.-Neem) | Meliaceae | Anthelmintic, carminative expectorant, leaves used in skin diseases, seed oil used for killing lice |
| <i>Blumea lacera</i> DC. (Kuksima -Beng.) | Asteraceae | Juice of leaves is anthelmintic, diuretic, stimulant, and febrifuge |
| <i>Chlorophytum tuberosum</i> (Roxb.) Baker (Beng.-Musli) | Liliaceae | Enhance physical activity, aphrodisiac |
| <i>Cissampelos pareira</i> L. (Beng.-Padh) | Menispermaceae | Used in diarrhoea, dysentery, colic pains, cough and urinary troubles. |

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| <i>Cissus quadrangularis</i> L. (Beng.-Harjora) | Vitaceae | Plant pest used to join broken bone |
| <i>Clerodendrum viscosum</i> Vent. (Beng.-Ghentu) | Verbenaceae | Locally used over boils and certain skin diseases, also anthelmintic, antiperiodic |
| <i>Commelina obliqua</i> Vahl. | Commelinaceae | Whole plant used as athelmintic |
| <i>Croton bonplandianum</i> Baill. (Beng.-Banlanka/Churchri) | Euphorbiaceae | Toothache, wound healing |
| <i>Curculigo orchioides</i> Gaertn. (Beng.-Talamuli) | Hypoxidaceae | Alterative, appetizer aphrodisiac, carminative, demulcent, diuretic. |
| <i>Desmodium gangeticum</i> DC. (Beng.-Salpani) | Fabaceae | Used in febrifuse and anti-catarrhalic medicine. It has also antipyretic property. |
| <i>Dioscorea bulbifera</i> L. (Beng.-) | Dioscoreaceae | Ulcers, piles, syphilis, kill hair lice |
| <i>Dioscorea triphylla</i> (L.) Amoen. (Beng.-) | Dioscoreaceae | Used to cause vomiting, purgative |
| <i>Elephantopus scaber</i> L. (Beng.-Hatikan/Gobhi) | Asteraceae | Decoction used for diarrhoea, dysentery and pains in stomach. It has anti-bacterial, anti-viral, anti-tumour and hepatoprotective properties. It balances the blood pressure also. |
| <i>Elsholtzia patrinii</i> Garcke. (Beng.-Sedok) | Lamiaceae | Oil of leaves is used in medicine which is aromatic. |
| <i>Fimbristylis cymosa</i> R. Br. | Cyperaceae | Juice of plant used in diarrhoea and dysentery. |
| <i>Flacourtia vulgare</i> Mill. (Baichi -Beng.) | Flacourtiaceae | Leaf juice having anti-diabetic effect |
| <i>Gardenia gummifera</i> L. (Beng.-Bon Gandharaj) | Rubiaceae | Antispasmodic, carminative, anthelmintic and antibacterial Gum-resin is used as carminative, stimulant and in dyspepsia. |
| <i>Hemidesmus indicus</i> L. (Beng.-Anantamul) | Asclepiadaceae. | Roots are used as substitute of Sarsaparilla; as tonic, diuretic, diaphoretic and demulcent |
| <i>Holarrhena antidysenterica</i> (L.) Wall. Ex Dc. (Beng.-Kurchi) | Apocynaceae. | Used to cure dysentery, and diarrhoea. |
| <i>Ichnocarpus frutescens</i> Ait. & Ait. (Beng.-Dudhilata) | Apocynaceae | Used to treat cough, thirst, vomiting, fever, biliousness, decoction used as nervous debility. Leaf paste used against skin diseases. Plant paste used on fractured bones. |
| <i>Lygodium japonicum</i> (Thunb.)Sw. (Beng.-Berajal) | Lygodiaceae | Decoction of plant parts (vegetative and spores) is used as diuretic and cathartic |
| <i>Meyna laxiflora</i> Robys. (Beng.-Mynaphal/Mynakanta) | Rubiaceae | Dry fruits is used for boils and dysentery |

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| <i>Mimosa pudica</i> L. (Beng.-Lajjwati) | Mimosaceae. | Used as sedative and laxative |
| <i>Mitrcarpus verticillatus</i> (Schumach. & Thonn.) Vatke. (Beng.-papra) /Rubiaceae | Rubiaceae | Anti-bacterial |
| <i>Mollugo lotoides</i> (L.) O. Kuntze (Beng.- Gimesak) | Molluginaceae. | Dried plant is used in diarrhoea; cure for boils, bilious attacks and for wounds and pains in the limbs. |
| <i>Mollugo pentaphylla</i> L. (Beng.-Ghoragime) | Molluginaceae | Stomachic, aperients, antiseptic and emmenagogue, and is used in poultice for sore legs. |
| <i>Ocimum americanum</i> L. (Beng.-Ban tulsi) | Lamiaceae. | Seeds are used in dysentery and chronic diarrhea, leaves are aromatic expectorant, stomachic and carminative |
| <i>Olax scandens</i> Roxb. (Beng.-Vaduriara) | Olacaceae | used in anaemia |
| <i>Pedaliium murex</i> L. (Beng.- Baragokhur/Baghnak) | Pedaliaceae | Urinary discharge, Inflammation, skin diseases. |
| <i>Phyllanthus fraternus</i> Webster (Beng.- Bhuiamlaki) | Euphorbiaceae | Used to treat Jaundice, ulcer, dysentery, also diuretic. |
| <i>Rungia pectinata</i> (L.) Nees (Beng.-) | Acanthaceae | Juice of the leaves is given in small pox and has cooling effect, anti-inflammatory |
| <i>Sagittaria sagittifolia</i> L. (Beng.-Tirusak) | Alismataceae | Antiscorbutic and diuretic |
| <i>Shorea robusta</i> Gaertn. f. (Beng.- Sal) | Dipterocarpaceae | Used in diarrhea and dysentery, and also in ointments for skin diseases, wound healing property. |
| <i>Smilax zeylanica</i> L. (Beng.- Ramdantan) | Smilacaceae | Roots are substitute for India Sarsaparila in treatment of venereal diseases, also applied for rheumatism and bloodless dysentery. |
| <i>Stephania japonica</i> (Thunb.) Miers. (Beng.-Tejomala) | Menispermaceae | Tubers are used for fever, diarrhoea and stomachic |
| <i>Tamarindus indica</i> L. (Beng.-Tentul) | Caesalpiniaceae | Fruit pulp is refrigerant, carminative and laxative, infusion of leaves is reported to be cooling and useful in bilious fever, poultice of fresh leaves is useful in swellings and boils, and for relieving pain. |
| <i>Vanguiria spinosa</i> Roxb. | Rubiaceae | Used to treat skin disease, also used as fish stupefying agent |
| <i>Vernonea cineria</i> Less. (Beng.-Sahadevi) | Asteraceae | Anthelmintic, diaphoretic, diuretic seeds Paste used locally in skin diseases and destroying head lice. |

Fruits available in the markets, weekly hats and in the hut premises of local seller who lived in a remote village. Some important fruits (raw and ripe) of this are Kendu, kalojam, amlaki, boichi, kusum, mahul, amm, chalta, kul,

amra, koith (Table 2) etc. All edible species available here though some are forest edge species and the frequency is very low. Due to increase of demand use of the products becomes higher which increases the species loss. Red ant is another non-timber forest produce (NTFP) of the forest and the demand of the same is locally high so it becomes threatened.

Availability of red ant and eggs in weekly market of Lalgargh (Wednesday) revealed the demand for local people. Presently the price is Rs. 200/- per kg. of such insect though some collectors collect the same and sale it to the zoo authority.

Table 2. Edible Fruit making Plants of Lalgargh forest in West Bengal, India.

| NAME and Bengali Name | FAMILY | USES |
|--|-----------------|--|
| Diospyros exculpta (Beng.-Kendu) | Ebenaceae | In market demandable fruit. |
| Eugenia jambolana (Beng.-Kalojam) | Myrtaceae | Important in the weekly market. |
| Phyllanthus emblica (Beng.-Amalki) | Euphorbiaceae | Always demandable but the fruits are smaller one. |
| Flacoutia ramontchii (Beng.-Boichi) | Flacourtiaceae | Edge of the jungle used by local people, small amount available in market. |
| Schleichera oleosa (Beng.-Kusum) | Sapindaceae | Ripe fruits edible also chutney making fruit by tribal. |
| Madhuca indica (Beng.-Mahul) | Sapotaceae | Young fruits used as vegetable. |
| Anacardium occidentale (Beng.-Kaju) | Anacardiaceae | Cashew apple and nuts are important. |
| Mangifera indica (Beng.-Aam) | Anacardiaceae | Plants available edge of the forerst, fruits used by cowboy. |
| Dillenia indica (Beng.-Chalta) | Dilleniaceae | Fruits are edible also used by elephant. |
| Spondia dulcis (Beng.-Amra) | Anacardiaceae | Fruits used for chutney also used to prepare pickles. |
| Tamarindus indicus (Beng.-Tentul) | Caesalpiniaceae | Raw fruits, ripe fruits, seeds, young buds used widely. |
| Limonia acidissima (Beng.-Rutaceae) | Rutaceae | Ripe fruits used for chutney. |
| Aegle marmelos (Beng.-Atha bel) | Rutaceae | Ripe fruits and leaves used. |
| Ziziphus jujube (Beng.-Kul) | Rhamnaceae | Ripe fruits. |

Forage plants found inside the forest even in the degraded land of the forest. Here the products available are Palmyra palm, date palm, stem less palm, kharang (*Aristida* sp.), and kush (*Eulaliopsis* sp.) which have a market demand and used round the year in and around the village (Table 3).

Loss of these create crisis of fodder to the wild elephants therefore they become aggressive and collecting food s from village premises rather than forest.

Table 3. Forage plants of Lalgargh Forest

| NAME | FAMILY | OTHER USES |
|---------------------------|-----------|----------------------------------|
| Borassus flabellifer | Arecaceae | Chatai making plant |
| Phoenix sylvestris | Arecaceae | Mat making plant |
| Phoenix acaulais | Arecaceae | Broom making plant |
| Aristida adscensceonoides | Poaceae | Broom making plant |
| Eulaliopsis binnata | Poaceae | Used in the preparation of rope. |

Some plant species available in the forest area are used as miscellaneous species viz. simul, sada simul, rail-lat, atang, sal, ban gandharaj, bhut-bhairabi, bon tulusi etc. (Table 4). Among them red and white silk trees (*Bombax* sp. and *Ceiba* sp.) attract sunbirds and rest species used widely for the production of different non-timber-produces (NTFPs) of the

same area (Table 4). Demand of the basket, prepared from atang (*Combretum decandrum*) is high and similarly sal leaves (green and dry) used widely to prepare sal plates, bowls and exports widely from the forest fringe area. So, they engage and develop local market for income generation.

Table 4. Miscellaneous species

| NAME | FAMILY | OTHER USES |
|---------------------|------------------|---|
| Bombax ceiba | Bombacaceae | Filling fibre |
| Ceiba pentandra | Bombacaceae | Filling fibre |
| Cissus adnata | Vitaceae | Chord making plant |
| Combretum decandrum | Combretaceae | Basket making plant |
| Shorea robusta | Dipterocarpaceae | Green, dry sal leaves, fuel, sal twigs, resins. |
| Gardenia resinifera | Rubiaceae | Gum resin. |
| Eupatorium odoratum | Asteraceae | Fuel wood. |
| Anisomeles indica | Lamiaceae | Fuel wood. |
| Hyptis suaveolens | Lamiaceae | Fuel wood. |

Lalgarh forest provides resource like green and dry sal leavaes (Table 4.), dry twigs as *jhati-jhuri*, tooth brush from sal twigs, atang stem for making basket, red ant a special item for making Santali dish, hatikan (dry roots of *Elephantopus scaber*) for the preparation of tablets used in making local beer (Haria), medicinal herbs, kalilat or dudhilat (*Ichnocarpus* sp.) for preparation of basket and as medicinal herb, fishing staff, edible fruits (Kendu/tendu, baichi, amlaki, harituki, bahera, chiranji, kalojam) etc. The leaves of small kendu plant (*Diospyros exculpta*) used for 'bidi leaf' preparation. Large Scale Multipurpose Society (LAMP) is actively engaged to collect and transport the bidi leaf abroad. Mahul (*Madhuca indica*) fruits are used for local wine preparation. Different types of grasses and stem less date palm for broom and brush making purpose.

But resources are limited and structural ambiguity is restricted though the use pattern is varied. Ultimately forest ecosystem becomes more fragile and losing its thick bonding by loosing own flora and fauna. Due to havoc collection of different forest products by any means disturbing the ecosystem process that hampered the productivity as well as eco-balance of the environment. Another degradation process is soil erosion and encroachment of cultivated land towards the forest patches by local people which pushing force towards the forest. A thin line between cultivable islands and forest patch always make bond to form eco-mixture land or ecotone. Conversion of the same land or same type of forest causes abnormality, ultimately it ruins the composition and interactions of species. Another threat in ecosystem is heavy penetration of exotic and alien species like *Eupatorium*, *Lantana* and *Parthenium* which hamper the normal onset of seedlings after monsoon. Heavy collection of twigs, leaves, medicinal plants, fuel wood, leaf litter and unscientific management pose another anthropogenic loss to the forest ecosystem though some part having scientifically managed as

the forest Protection committees are there. So, need scientific study, social manipulation and departmental liability including multifunctional activities of the local people to retain the forest for eco-sustenance of resources. Social and cultural practice in a common platform may get the benefit in a wide range. Hope that all people will come to a common platform and will take action to protect forest and will use resources to make an ecosystem sustainable. If continued, our ecosystem would becomes pristine rather than degraded.

IV. PHOTPLATES

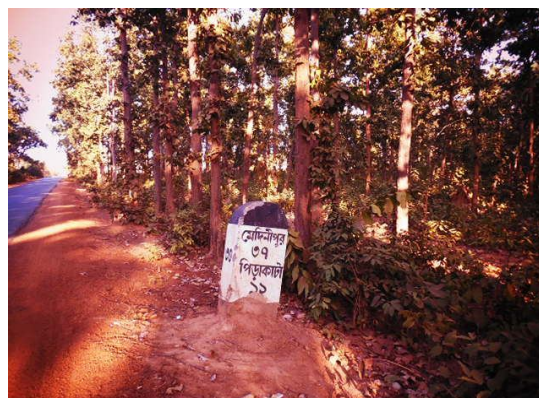


Fig 1. Lalgarh Sal Forest



Fig. 2 Sal forest admixed with ziziphus jujube tree.



Fig. 4 Red ant marketed at Lalgarh hat



Fig. 3 Grazing and browsing in the jungle



Fig. 5 Atang basket available in market



Fig. 4 Selling puffed gram in the market



Fig. 6 Roots used to prepare haria tablets



Fig. 7 Mahul fruits (dry) in a market at Lalgarh



Fig. 8 Grazing inside the forest



Fig. 9 Eucalyptus in forest



Fig. 10. Bamboos near forest



Fig. 11 Red lateritic road



Fig. 12 Plantation stand



Fig. 13 Kendu tree (Diospyros sp.)



Fig. 14 Villager going to cultivate land



, Fig. 15 Culture of tribals in a Govt. programme



, Fig.16 Culture of tribals in a Govt. programme

V. ACKNOWLEDGEMENT

The author is thankful to the authorities of Forest Department, Govt. of West Bengal for necessary help. Thanks to the senior officers and Professors for cordial help as and when required from Botanical Survey of India, Agriculture Department and Universities (Vidyasagar University Sidho-Kanho University, and University of North Bengal). I am thankful to the UGC for supporting financial assistance during study in field regarding ecological status of plants in the same area. Last but not thanks to the local people who helped me better during study in field at Lalgarh of West Bengal, India.

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