Chapter 4

Use of Forest

The standard of living of the inhabitants of a particular region is wholly attributable to their capacity to use the natural resources in an effective manner. The society that could be able to develop the concepts for value-addition to the natural resources confers a greater rate of progress to the lifestyle of its members. These concepts help the people to use the naturally available plants and minerals to grow abundant food and fuel, to extract fibres for making cloths, to build houses to support a comfortable living and to make drugs to fight diseases.[1]

This modern concept of development was squarely applicable to the historical time as well, having enough bearings upon the life of the tribals, predominantly living in the hilly terrains of Eastern *Ghāts* of the Indian peninsula. The present condition of the people of the south Odisha as a whole and the tribals living in the forest area in particular is merely a function of the primitive knowhow, which they were holding before British occupancy over the area. The Colonial legislations administratively restructured and redefined the relationship of the original inhabitants with their environment, which was so far being enjoyed liberally.

Therefore, 'use' is a superlative term defining the degree of development of the society. To its contrast, 'misuse' is more a subjective and situational term which restricts the liberty of the users through legal and administrative means; primarily to establish the interest of the state to facilitate unabated collection of the natural resources for public use or to impose duties and taxes for augmentation of revenue or with an objective to protect it from indiscriminate exploitation by the inhabitants living in the vicinity of the forests. The contrast in the underneath concept may be elaborated from the fact that, in days not too far flung in history, the state had been sponsoring cleaning of forests and awarding the poaching of wild animals considering the same as negative elements to agricultural propagation and threat to human life respectively. In due course of time those turned out to be illegal activities with the promulgation of laws with restrictive provisions.

A greater part of the dryland of the earth was covered with vegetations consisting of varieties of trees and shrubs grouped according to the climate, soil and other geographical features. In pre-colonial period, in the absence of systematic interference from the part of the rulers, forests and their produce had been considered by the dwellers

ISBN: 978-81-961472-4-2 (e-book)
: 978-81-961472-5-9 (Paperback)
Thesis DOI:10.21467/thesis.153

as a free gift of nature and were subject to unabated utilization. Later on, protection of forests was thought of, and state sponsored measures were designed, for several purposes which *inter alia* includes the preservation of forests from attacks by animals, insects, noxious plants, in particular fungi, natural phenomena and other injurious agencies.[2]

The importance of the forest in the life of the people living in its vicinity is realized through the produce which it yields for consumption by them or by their domesticated animals, the capital to which it represents and the labour which it generates for their sustenance.

Forest products have typically been divided into two categories viz. Timber Products and Non-Timber Forest Products (NTFP). The timber category usually includes sawn wood, pulp, panel boards and other building materials. The NTFP category includes everything collected mostly for food, though a range of medicinal plants, resins and essential oils for their chemical components, fibres such as bamboos and others used for weaving and structural application. [3]

4.1 Minor Forest Products

Wood or timber was the principal produce of the forests. Odisha was very rich in terms of Essential Forest Produce (EFP). The National Commission on Agriculture has defined EFP / MFP (Minor Forest Produce) as 'all produce obtainable from forests other than wood'.[4] Historically, Non-timber Forest Produce or NTFP was a collective term assigned to all the forest produce other than timber. The NTFPs was an important means of livelihood of the people but due to its diversified nature it could not be duly assigned with any defined nomenclature and subject to varied interpretations according to common understanding and convenience. Till now, no Acts, rules, policies or administrative reports have explicitly defined NTFP. Though, the IFA, 1927 provided an important legal framework for the administration and the management of forests, it was silent about the definition of NTFP. The FRI (Forest Research Institute) emphasized to simplify the term by stating that the NTFP covers all forest produce other than major forest produces.[5]

Wood which bears certain quality for applications like construction, ship-building, machineries, industries, agriculture, tools, furniture, etc. are called as timber-wood and the varieties which had no desired quality for such applications are used as fuel for domestic or industrial purposes and termed as firewood. However, in those days iron and other metals had been to a considerable extent, used as substitutes of timber. Similarly, coal and its other forms like lignite and peat were being used as the substitutes of firewood. A part of the firewood was being converted into charcoal or ashes. Considerable quantity

of charcoal was being used for the purposes like domestic firing, iron smelting etc. and ashes were being used for manufacture of potash or as manure.[6] All the forest produce which were not timber or firewood were termed as MFP or NTPF. Amongst the MFPs, bark was used for manufacturing of turpentine, resin, catechu and numerous other dyestuffs. Some varieties of barks were directly used for tanning of animal skins and hides. Other MFPs like leaves, flowers, fruits, seeds, fibres, grass, moss, peat, bamboos, canes, lac, honey, wax had immense commercial importance. Some of those were being used exclusively in villages, while others were being extensively used as raw materials in industries.

Forests occupy a significant portion of the earth's surface; hence forestry had been considered as a part of agriculture during the colonial period. Forests were considered as potential capital for industries since they contributed timber for construction of infrastructure like the buildings and industrial structures. The plants and machineries like the looms were also widely built from timbers. Forests were essential source of raw materials for the industries. But the most important contribution of the forests towards the economy was its capacity to generate direct and indirect labour and employment. Collection of the forest produce, its processing at its source like sun-drying, packaging, preservation, transportation and logistics, the subsequent value addition process of manufacturing by using those as raw materials, conducted through the industries and ultimately the marketing of the goods; all such works required unskilled, semi-skilled and skilled labour force and hence generated opportunities for employment in a massive scale. At the second place such operation also required incidental employment opportunities in the field of administration, accounts and management.

Leaves of the trees were used for fodder, manure, thatching, tanning, dyeing, etc. Leaf fodders were extensively used for cattle growing. The foliage of woody climbers was also used as leaf-fodder to the actual benefit of the forests.[7] The leaves of various forest species were also extensively used for manufacturing of drugs. Some utilities like hat, umbrella, dining plates were also made from leaves of various plants. Such leaves were also used as feedings for the silkworms. Fruits of forest trees were collected and consumed as food or used as fodders for the animals. Similarly, oilseeds were crushed or extruded for extraction of edible as well as non-edible oil, and for applications like dyeing, tanning etc. The seeds collected from the wild were used for plantation and agriculture purposes for commercial cultivation of specific types of plants.

Numerous small and cottage industries were built for processing of the forest produce other than timber. Such manufacturing or processing units were engaged in extraction of sandalwood oil, *catechu, kathā,* palm *rosa* oil, lemon-grass oil, camphor, charcoal, resin and turpentine and other distillation products, tans, dyes, drugs, spices, fibres, flosses and other edible products of great varieties. The MFP section of the forest department used to collect information on the above commodities and provides the same to the forest contractors, chemical workers, drugs experts and merchants to update their knowledge about its availability. The technical information like the constituents, uses and commercial demand of such forest produces was also being analysed and disseminated among its potential users. Over 250 numbers of such inquiries were dealt with in 1934 by the Forest Research Institute. Similarly, 300 numbers of inquiries were received in 1935.[8] The Institute had done much useful work for the small traders although none of the results were particularly spectacular.

Various ways in which the forests usually influenced the economy and environment of the region are listed below:

1. Forests were the great source of timber, fuel and other forest produce.
2. They offered a convenient opportunity for the investment of capital and for enterprise.
3. They facilitated generation of labour and employment in their collection, logistics, management, processing, and marketing.
4. Secondary and manufactured products were produced by forest-based industries which were sourcing raw materials and adding value to it.
5. They even reduce the climatic temperature, conserve the earth's surface, improve soil fertility and contribute to maintain the sustainability of the climate.
6. They also increase the relative humidity of the air which reduces evaporation.
7. They tend to increase precipitation of moisture contributing to more rain in and around the forest areas.
8. They help to regulate the water-cycle by retaining and controlling the flow of water through springs, tend to reduce violent floods and maintain consistency in flow of water in the rain fed rivers for a longer period of the year.
9. They prevent soil erosion, landslides, avalanches, the silting up of rivers and lowlands and arrest shifting of sands.
10. They reduce the velocity of air currents, protect adjoining areas from the extremity of cold or dry wind falls and afford shelter to all types of life forms.

11. They, moreover, assist the production of oxygen and ozone.[9]

In earlier times when forests extended beyond human requirements and unimpaired natural forces maintained them intact without any artificial assistance, forest utilization comprised the whole of forestry. Abundant supplies of forest produces were available for all possible requirements. This was done for ages without any regard for economy or for the wants of future generations.[10]

Invincibility of the forest areas due to lack of approachable roads and access to the marketplace with demographic concentration where timber as the primary forest product might have a wider utilitarian value restricted its scope for overexploitation.

But later on, there was a trend reversal which witnessed the indulgence of the people as well as the Colonial Government in the practice of utterly wasteful utilization of forest resources. Such a trail of practice continued, until a wood-famine was felt to be imminent; for the demands made by a steadily increasing population on agricultural produce involved the clearance of vast areas of woodland, while the prolonged maltreatment to which forests were subjected had considerably diminished their productiveness.[11]

Forest raw materials were utilised in various ways. Forest utilization was made as a systematic arrangement of the most appropriate methods of harvesting, converting and profitable disposing of forest produce, in accordance with the results of experience and study.[12]

Wood or timber in terms of its quantity, value or utility has ever been considered as the major forest product. Besides wood, there were numerous other useful products which were derived either from the plants or from the soil of forests. Most of them were relatively inferior in value to wood and their production was bound up with the existence of forests. They were considered as accessory or minor produce (MFP).[13]

Theoretically speaking, MFPs consisted of all the useful produces that was sourced from the forests except organized cutting of timber or bamboos, both segments i.e., the timber and the MFPs were generally intended to use by non-tribesmen for industrial and construction applications. MFPs were in fact considered as the backbone to the survival of the tribals. Collection of MFPs from the forests was termed as a collection activity rather than an activity of cultivation. Those were available to the tribesmen at the cost of labour hours they put for such collection. Several of the MFPs were consumed as food by the tribesmen. Its importance in the life of the tribals may be construed from the fact that, at certain times like the rainy season, when the grains harvested in the previous

season got exhausted and the new harvest was still awaited, MFPs were treated by them as their staple food and not merely as a supplementary diet.[14]

The significance of the MFPs to a tribal family was such that, it ensured a perennial source of employment for all its members. It provided independent purchasing power to every individual. MFPs were a part and parcel of the social, cultural and religious life of the tribesmen. [15]

The tribal communities, particularly the primitive tribes who continue to live in the forest, depend upon the forest for their food, shelter and even to some extent for clothing. The customs of the tribal community including their religious practices, arts and crafts, social fabrics and folklores have been nurtured and enriched by forests in which they were living in virtual symbiosis from the dawn of human history.[16]

The contribution of forests to the economy of the tribal people was immense. All the necessities of life of the tribal people such as fuel, fodder, wood for construction of houses and agricultural implements, medicinal herbs for curing ailments, animals and birds for hunting and roots and tubers to meet the needs of food were being obtained free of cost from the forest. It was also contributing to a third of their income from the sale of EFP.[17]

In Odisha, the management of forests started in the year 1883-84 with the constitution of Orissa Forest Division at Anugul functioning under the control of the Conservator of Forests of the Beṅgal Presidency. In 1912, Odisha was separated from Beṅgal and tagged up with Bìhār, after which two more forest divisions were created with headquarters at Puri and Sambalpur.[18] The forests of south Odisha during that period remained under Madras Presidency, and they were administered under the provisions of the Madras Forest Act of 1882.

The forests of south Odisha were rich in EFP of various types. They consisted of major forest products and essential non-timber forest products. The major forest products were timber, small wood, fuel wood and charcoal. The essential non-timber forest products included all products whatsoever obtainable from the forests other than wood. Thus, EFP was composed of products like vegetable, animal and the minerals except those which were under the control of the Mining Department. It is only such surplus produce, after fulfilling the common needs of the local population, was being given over to forest marketing.[19] The items of essential forest products may be classified into the following categories:

1. Fibres and flosses
2. Grasses, reeds, cane and fodders
3. Essential or volatile oils
4. Tannins and dyes
5. Gums, resins and oleoresins
6. Drugs and medicines
7. Edible products
8. Oil seeds
9. Leaves
10. Animal material and miscellaneous products.

4.1.1 Fibres and Flosses

Fibres are obtained from woody species. Fibres may be classified into three categories namely:

(a) Soft fibres like jute and flax which are derived from bark of the stems,

(b) Hard fibres collected from the leaves of Manila hemp and *Sisāl*, and

(c) Surface fibres collected from the surface of stems, leaves and seeds like cotton.

Fibres have been extensively used in textiles and for netting and cordage. Plating and weaving fibres have been used for making baskets, straw-hats, mats, chair seats and other forms of weaker works. Certain fibres were used as brush-fibres, filling fibres, papermaking fibres and in the manufacture of natural fabrics.[20]

The trees which give fibres from their stems are *Calotropis giganta* (*Arakha*), *Acacia leucophloea* (*Ghoriā*), *Bauhinia vahlii* (*Siāli*). Similarly, fibres were collected from the young roots of *Butea monosperma* (*Palāsa*), from roots of *Ficus benghalenis* (*Bara*), from the bark of *Ficus religiosa* (*Aswasth*), *Sterculia villosa* (*Kodalā*), *Sterculta urens* (*Geṇduli*), *Abrees precatorius* (*Kāincha*) and *Kydia calisina* (*Kapāsiā*).[21] The bark of *Abrees precatorius* yields a tough fibrous tissue, from which cordage was manufactured. It is considered as a good substitute for hemp. To prepare fibres, the bark is simply required to be steeped in water for about a week, which separates the fibre from the bulk by melting down the gummy binding substance of the bark. Once extracted the fibres require no further cleaning. The stem of *Abutilon indicum* (*Pedipedicā*) yields strong fibres fit for manufacture of the ropes.[22] The large leaves of *Bauhinia vahlii* are collected and sold to make leaf plates. The seeds are eaten raw when ripe, that tastes like cashew nuts and ropes are made from its bark. The natives boil and then beat the fibrous bark to make it soft and pliable.[23]

Fibres from Leaves

Plant leaves yield fibres. Some of the species whose leaves yield fibres are as follows:

- *Agave cantula* (*Baramāsi*), *agave sisalana* (*Sisāl*) and *Caryota urens* known as Indian *Sāgo* palm are leaf fibres yielding plants.
- The *Agave* species are extensively used for demarcation purposes and live hedges and the fibres obtained from their leaves yield a certain amount of revenue.
- *Caryota urens* fibres is strong and of fair length. It is used by the fishermen in preparing their nets and fishing lines.[24]

Methods of Processing

Barring air-drying, sun-drying threshing or aggregation; very little processing of EFP was being done at the local level. The products are sold raw, as soon as they were collected. The method of extraction of fibres differs from species to species. The process by which fibres are loosening from the woody plant tissues is called as retting. The plant stems are kept in water which melts and removes the gummy substance. Fibres which were extracted from the leaves were thoroughly washed and then dried under the sun. Grasses were collected manually, dried and then arranged in bundles.[25]

Flosses

Flosses were used for varied purposes that included manufacture of life belts and as stuffing in mattresses, pillows or cushions. The most important floss yielding species found in the forests of south Odisha were *Bombax celiba* (*Semul*) capsules. Those trees yield floss which is soft and strong and widely used for life saving appliances at sea and also as a stuffing in mattresses and pillows. *Catatropis giganta* (*Arakha*) is yet another species, the fruits of which give fine silky, soft, glossy and resilient floss materials.[26]

4.1.2 Grasses, Reeds, Canes and Fodders

The natural fodder produced in forests is composed of grasses and other herbage growing on the ground. Leaves and young shoots of some woody plants were also used for that purpose. Those materials can be used in several ways as cattle-fodder either by driving the cattle into the forest to graze on it or by allowing men to cut grass or the leaves of woody plants and use them as stall fodder. Thus, forest fodder is divided into various categories as pasture, grass-cutting and leaf fodder.[27]

Forest pasture means the utilization of herbage and grass of a forest by the admission of the cattle. Grass cutting was found where agriculture was more profitable and because of the need of stall-feeding of cattle in certain circumstances. The foliage and young shoots of woody plants were used in a similar way to herbage for cattle fodder.[28]

Eulaliopsia binata (*Sabāi)* was the most important grass of great economical value of those days. This grass is extremely suitable for manufacture of paper and pulp. It was locally used for making ropes and furniture. The *Thysanolaena maxima* **(**broom grass**),** widely produced in the wild has been used for broom making**.** It was mostly grown on the banks of forest streams in the mountain terrains. Koraput, Kotgarh, Tumudibandha, Bālligudā, Raikiā, Kalingā, G. Udayagiri, Phulbāni and Tikābāli areas are still famous for the production of broom grass. The broom sticks are the flowers of the plant. The tribal people collect these flowers from the forests during the months of January to April every year. After collection the broom flowers are dried under the sun. With the help of *Siāli* fibres the broom sticks were bundled to size.[29] The estimated production of brooms from the area was about six lakh bundles per year, most of which was exported to outside markets. Grasses of various types were used for thatching purposes.[30]

Fodder plants were of numerous types. There were many trees, the leaves of which were relished by cattle and goats. Some of the common fodder trees of south Odisha were *Acacia catechu* (*Khaira*), *Acacia nilotica (Babul), Azadirachta Indica* (*Neem*), *Bombax celiba* (*Semul*), *Butea monosperma* (*Palāsa*), *dendrocalomus strictus* (Bamboo), *Ficus benghalensis* (*Bara*), *Ficus religiosa* (*Aswastha*), *Gmelina orborea* (*Gambhāri*), *Lagerstroema parviflora* (*Siddha*) and *Polyalthia longiflora* (*Debadāru*).[31]

4.1.3 Essential Oils

Essential oils are the volatile odoriferous liquids occurring in many plants. They evaporate when exposed to air. Different parts of the plant such as fruits, flowers, leaves, bark, root, wood and seeds yield such essential oils of aromatic smell. Various methods like distillation, evaporation and extraction by solvent using effleurages and maceration had been adopted for the extraction of essential oils from plants.[32]

Some of the essential oils produced in the area were ginger grass oil, lemon grass oil, citronella oil, palmarosa oil and vertiver oil. The important wood oils were *agar* oil and sandalwood oil. The important leaf oils were camphor oil, cinnamon leaf and bark oil and mint oil. There were also some root oils like *Costus* oil and *Khuskhus* oil which were aromatic in nature. Different kinds of essential oils were extracted from flowers like *Champā, Kiyā, Ketki* and rose.[33] The sweet-smelling oil, *Chuā*, was a very common

household article. It was also used in ceremonial occasions. The oil had a dark appearance with a lasting scent but very often adulterated with cheaper vegetable and mineral oils. The source of its manufacture was the resinous exudation of the *Sāl* trees, which usually come into the market as lumps under the name *jhunā* which was commonly used even as on to-day, directly as incense. In the dry process, when the powdered *jhunā* is placed over red-hot charcoal, a white aroma arises which is sublimated to get *Chuā* oil.[34]

4.1.4 Tannins and Dyes

The name tannin is assigned to organic substances which have the property of combining with albumen and gelatine naturally present in the animal skin to form an insoluble compound which usually resist its decay. Tannins are secretions of plant tissues. They are used mainly to render the hides and skins resistant to decomposition and make them strong and flexible. The bark of many trees yields bark tans. Generally, the barks were obtained from felled trees. The important trees which yield bark tannins were:

Acacia nilotica yield tannins of superior quality. *Anogeisius latifolia (Dhaurā)* leaves were used for extraction of tannins. *Cassia fistula* (*Sunārì)* bark yielded a good stuff of tannin and exploited mainly in Korāput, Bālligudā, Phulbāni and Ghumsar Divisions.

The average annual collection of this MFP was about 38,000 mounds which were mainly exported to outside markets. *Shorea robusta* and *Terminalia arjuna* produce tannins of reddish-brown colour of very good quality. Some fruits like *Termanelia chebula* (*Haridā*), *Terminalia bellerica* (*Bāhādā*) and *Emblica officinalis* (*Amlā*) yield tannins from its fruits.[35] Leaf tans were generally used by local tanners. *Anogeissus latifolia* (*Dhaurā*) and *Carissa spinarum* (*Khairakoli*) yields leaf tan of a good quality.

Wood tan was basically obtained from the barks of several plants. No standing tree was stripped off its bark for extraction of tannins. The rainy season was avoided for its harvesting. The stripped off bark was dried under the sun for some days and put in a wooden pot to which steam was applied for extraction of tan liquor from the bark. The liquor was purified and mixed with other substances to give the desired quality and colour to leather. *Cassia fistula* (*Sunārì)*, *Acacia nilotica* (*Babul*) and *Acacia catechu* (*Khaira*) barks contain wood tannin.[36]

Sunārì bark should be scaled from trees of 15 cm in diameter and above the breast height. All such trees should be felled flush to the ground taking care that the cut was not soiled and collected in absolutely clean condition.

Dyes

Many plant tissues yield dyes. There were wood dyes, bark dyes, flower and fruit dyes, root dyes and leaf dyes. The plants of *Artocarpus* family yield wood dyes. The wood was powdered and boiled in water to collect the dye concentrate. By this process a bright yellow dye was obtained.

The bark dyes were obtained from *Acacia* and *Terminalia* species. The flowers and fruits of many plant species yield valuable dyes which are more important than the dye obtained from wood, bark or roots. *Butea monosperma* yield a bright yellow colour dye from its flowers. The fruits of *Mollotus phillippinensis* (*Kamalāgundì*) yield a red dye which was the most popular dye produced in the area. The ripen fruits of *Kamalāgundì* were collected and powdered. Sometimes the fruits were soaked in water and dried before the dye was extracted from it. The root dyes were obtained from certain plant species such as *Morinda pubescence* (*Achu*) and *Punica granatum* (Pomegranate). One of the well-known species yielding leaf dye was *Lawsonia inermis* (*Mehendi*). Its leaves yield an orange dye.[37] Animal dyes were not usually used. But the crimson dye obtained from the lac insect was an important commercial product.[38]

The native people consume the fruits of the marking-nut (*Banabhāliā*) and sold the dried seeds. The seeds were used for various purposes. The liquid produced from these seeds was used for the preparation of a black colour which protects the body of the ship from water. It was also used in railways and handloom industries for similar purposes.[39]

4.1.5 Gums, Resins and Oleoresins

Gums and resins are exuded by plants mainly from the stems, roots and leaves. Gums are a sticky substance which are soluble in water or may be softened on application of water. Resin were natural polymers with a plastic consistency and soluble in alcohol but unaffected by water. Those are commonly known as hard resins. Oleoresins are natural mixtures of the kind but containing a fair percentage of essential oils while the gum-resins are a mixture of gums and resins.

Gums are formed as a result of disintegration of plant tissue through a process called Gummosis. Natural gums emanate from plant in liquid or semi-fluid state which on exposure to atmosphere dries up into translucent amorphous flakes. Those which were having the least colour and highest adhesive power were most valuable in the market. Some varieties were used for clarification of liquors, finishing of silk and preparation of quality water colours. Intermediate grades were used in confectionery, cosmetics,

pharmaceuticals, printing inks and in dying. The cheaper grades were used as adhesives and in printing industries. Two types of gums were widely used in those days for commercial purposes i.e. gum *Arabic* and gum *Tragācanth*. The gum *Arabic* was collected from *Acacia senegal* and *Acacia nilotica.* The gum collected from *Anogeisius latifolia* which was known as *Ghāttigum* was used for dying and block printing on fabrics.[40]

Geṇduli gum obtained from *Sterculia urens* was used as a substitute for the real gum *Tragācanth*. The gums were exuded in the following manner:

a. Spontaneous exudation in dry seasons.
b. Charred trees affected by forest fire exude gum.
c. Artificial incursion allows gum to flow out.
d. Heavy and intensive tapping causes gum to exude.

Some important species of the area which exudes gums are *Acacia catechu* (*khaira*), *Anogeisius latifolia* (*Dhaurā*), *Bauhinia retusa (Kanchana*), *Acacia arabica* (*Babul*). Similarly, *Albizzia lebbek* (*Sirissa*) which exudes a considerable amount of gum was used for many ordinary purposes and had fairly high commercial turnover. *Acacia arabica yields* a transparent gum. The gum was procured by making incisions in the bark and the sap running out therefrom hardens in lumps of various sizes. It exudes principally during the months of March and April.[41]

Technically speaking, gums are the transparent amorphous substances which are the degraded products of cell-walls of woody species which exude spontaneously from the tree. Gums are mostly soluble in water. Gums absorb water and swell up to form mucilage or jelly. No gum is soluble in alcohol and this is the fundamental difference between the gums and resins as most resins are contrarily soluble in alcohol but not in water. Gum-resins are essentially a mixture of gum and resin, formed naturally in the wood-cells by the degradation of cell-wall and the drying up of the plant juice.[42]

Gums were obtained in various ways. In some cases, the gums exude spontaneously in hot summer months and in dry seasons. Trees exude gum which was charred by forest fire and it was also collected by hand. In the forests of south Odisha gum was extracted from *Acacia nilotica* (*Babul*) and *Acacia catechu* (*Khaira*), *Anogeisius latifolia* (*Dhaurā*), *Sterculia urens* (*Geṇduli*), *Terminalia bellerica* (*Bāhādā*) and *Buchanania lanzan* (C*har*).[43]

Acacia catechu (*Khaira*) never give any gum during the rainy season. The gum oozes out naturally from the wounds of the tree during the dry seasons, casually from the

injured parts of the tree. These trees can be tapped for a couple of years. *Anogeisius latifolia* (*Dhaurā*) yields a gum which was called *Ghātti*.

Bauhinia retusa (*Kanchana*) gives gum of superior quality. It was customary to cut a deep blaze on its stem with the help of a sharp knife which cause the gum to ooze out from the blaze during the hot summer season. Each tree was tapped for four to five years and then allowed a resting period.[44] *Acacia Arabica* (*Babul*) yields a transparent gum. The gum was procured by making incisions in the bark, and the sap running out hardens in lumps of various sizes. It exudes principally during the months of March and April.[45]

Sterculia urens (*Geṇduli*) was the source of *Gum Karāyā.* The gum which exudes from the tree was of four grades. The finest grade was either white or colourless; the second grade was either pinkish or dirty white. The third grade was black in colour and the fourth grade was dust like. The main properties of gum *Karāyā* were that they were not soluble in water but swells into a soft mass. It was a substitute for gum *Tragācanth*.[46]

There were certain Rules guiding the procedure of collection of *Geṇduli* gum which was worth mentioning here:

1. Trees above 90 cm girth at breast height should only be selected for tapping.
2. Tapping should be done between October and May by marking a blaze of 15 cm x 10 cm x 2.5 cm size thick on trees with a sharp-edged axe.
3. The blazes should not be deeper than 0.5 cm below the cambium layer of the plant.
4. Initial blaze should be made at least 30 cm above the ground level. Only one blaze is enough per trees between 90 cm to 150 cm girth. However, in the trees of more than 150 cm girth, one extra blaze was allowed to be made.
5. Blaze should be smooth, without having any loose of fibres or giving scope for collecting water.
6. Gum is collected after 7 to 15 days of blaze making and freshening is done at times of collection.[47] *Geṇduli* gum was used as an ingredient in sweets and chewing gum.

Resins

Resins are usually solid or semi-solid substances, insoluble in water but generally soluble in alcohol. Resin secrets from cavities or passages in many plants. When the resin exudes from the bark, they get hardened on exposure to air and sunlight. Resins are used for a wide variety of purposes. Certain types of resins are melted and mixed with seed oil or turpentine oil to form oil varnish. Some resins are dissolved in alcohol to form spirit

varnish. They are dissolved in alkali to form soaps. They are also used in medicine and pharmacy, for sizing papers, for incense and in the preparation of sealing wax.

The resins may be classified as hard resins and oleoresins. *Copal*, *Dammar*, *Amber*, *Lacquer*, *Sandarac* and *Mastic* are some of the commercial hard resins. *Dammar* is mainly used in the manufacture of varnish and bottling wax and also used as a substitute for Burgundy pitch for medical plasters. Resins of different types were collected from different species. *Boswellia serrata* (*Salai*) gives *Salai*-resin. A piece of bark was peeled off at a certain height of a fully-grown tree exposing ducts containing resin. The first collection was made after two weeks. *Salai* gums exude from the blaze in long tears. It hardens after about four days and retains its golden colour and transparency. The tapping was done in the month of November and goes on up to July until the monsoon sets in.

Oleoresins

Shorea robusta (*Sāl)* is a source of oleoresin. Resin exudes from a blaze in the tree trunk and solidifies on exposure to environment. Blazing is done at the highest level to exude more resin from September to November.[48] Oleoresins are resins which contain a percentage of natural essential oils. *Balsam*, Turpentine, *Copaiba* and *Elemi* were commercial Oleoresins. Gum-resins are a mixture of both gum and resins. *Boswellia serrata* extrudes gum oleoresins. It has been in use since time immemorial, mainly as incense and as medicine to get relief from rheumatism and nerves diseases. The bark of *Canarium strictum* (*Dammar*) excludes resin which flow from vertical incisions for six months yearly and this flow goes on for about ten years. It was mainly used for manufacturing of varnish, bottling wax etc. *Shorea robusta* yields an oleoresin. Each mature tree can yield on an average 5 Kg. of resin every year. Resin also exudes naturally from injuries caused by heart-wood borers.

4.1.6 Drugs and Medicines

South Odisha is a veritable emporium of herbs. The medicinal use of plants was known to the inhabitants from time immemorial and inherited from generation to generation. There is no documentary evidence of their knowledge or usage of such flora for different ailments. They impart their knowledge by oral transmission to their succeeding generation. They used many plants as cure for snake bites, piles, dysentery and diarrhea, leucoderma, clinical jaundice, loss of hair, malaria and different types of fever, cough, cold, arthritis, diabetes, nose bleeding, gum and dental care, bronchial asthma and many other diseases. [49]

Man, from ancient times has been using medicinal herbs to get relief from various diseases. Roots, tubes, stems, bark, leaves, fruits and flowers of various medicinal plants are used as curatives for different diseases. The important EFP of medicinal importance that has been collected from the forests of south Odisha were *Amlā*, *Bāhādā*, *Haridā, Bana Tulasi*, *Chireita*, *Dhātuki*, *Gaba, Indrajabā*, *Kāincha, Kochila, Nāgeswar* flower, *Palāsa,* etc. The tribal people collect plants or parts of plants to use as herbal medicine. The traditional use of plants against diseases has been developed since time immemorial. Some of the medicinal plants used by the tribal people were enumerated below:

***Abrees precatorius* (*Kāincha*):** Its root yields an extract similar in medicinal properties to liquorices, though somewhat a little bitter to test. The leaves yield the substance even more than its roots. The roots mixed with honey were applied externally to swellings; pulverized and mixed with sugar were given to mitigate coughs. The seeds were employed externally in ophthalmia.[50]

***Abutilon indicum* (*Pedipedicā*):** Its leaves contain a great deal of mucilage. A decoction was used as an emollient fomentation and an infusion of roots were applied as an anti-pyretic to subside the body temperature in fevers.

***Acacia arabica* (*Babool*):** The variety of plants which yield red gum was considered as most efficacious in coughs, rheumatism, mucus discharges and also in diabetes. The bark was used as a tonic in infusion and a strong decoction of it was employed as a wash for ulcers. The finely powdered and mixed with *gingely* (sesame) oil was recommended as an external application to cancerous affections. The pods were used in coughs.[51]

***Acacia catechu* (*Khaira*):** *Catechu* had been used in cases of intermittent fever in conjunction with infusion of *Chireittā*. Finely powdered *catechu* had also been successfully used in ointments mixed with other ingredients in the treatment of obstinate ulcers and leprous affections.

***Acacia concinna* (*Śhikākāi*):** A considerable trade was carried in the pods of this shrub, which resembles the soap-nut and was used for washing hair. The leaves were acidic and used in cooking as a substitute for tamarind.[52]

***Achyranthes aspera* (*Apamārang*):** Its seeds were given in hydrophobia and in cases of snake bite as well as ophthalmic and cutaneous diseases. The flowering spikes rubbed with a little sugar were made into pills and given internally to people bitten by mad dogs. The leaves taken fresh and rubbed to a pulp applied externally was considered a good

remedy to bites of scorpions. The ashes of the burnt plant were a native remedy in dropsically cases.[53]

***Aegle marmelos* (*Bel*):** Its fruit contains a large quantity of transparent gluten, which turns hard on drying. The fruit was nutritious and alternatively used for improvement of the digestive system. The bark of the root was given in compound decoctions in intermittent fevers and the leaves made into poultices in ophthalmia. When dried before it ripens, the fruit was used in decoction in diarrhea and dysentery. The ripe fruit mixed with tamarind forms an agreeable drink.[54]

***Agate grandiflora* (*Agasti*):** The bark which was very bitter in taste was used as a tonic. The natives put the juice of the leaves in nostrils in bed fevers on the day of the paroxysm. The juice of the flowers was squeezed into the eyes for expelling dimness of vision.[55]

***Agathotes chirayata* (*Chireitā*):** It was one of the most esteemed of the medicinal plants, being especially valuable as a tonic and febrifuge. The whole plant was pulled up at the time when the flowers began to decay and dried for use. The root was the bitter part of the plant. It was applied in fevers, stomach disorder and skin diseases. The dried herb possesses all the stomachic, tonic, febrifuge and arthritic virtues. A decoction of the dried plant with hot water was usually administered.[56]

***Alangium salvifolium* (*Ankula*):** The pounded leaves of the plant were tied in a fine cloth and dipped in fermented rice water for some time. To cure conjunctivitis, a few drops of the content were squeezed into the opposite ear of the patient as ear drops.[57]

***Anona squamosa* (*Seetā phal*):** The leaves gently bruised and mixed with salt, and reduced to the form of plaster, was applied to malignant tumours, which act powerfully in ripening them.

***Artocarpus integrifolia* (*Panasa*):** Decoction of stem bark was used as nasal drops for headache.[58]

***Asparagus racemous* (*Satāvari*):** The root boiled with milk was given in bilious affections. The leaves were boiled and mixed with ghee and applied externally to promote suppuration in boils and tumours. It increases the appetite and removes pains in the bowels and also considered to prevent the confluence of smallpox.[59]

***Azadirachta indica* (*Neem*):** The bark of the tree has been widely applied as a substitute for *Cinchona*. The natives consider it as a most useful tonic in intermittent fevers and

chronic rheumatism and administering it either in decoction or powder. The dried leaves, added to common poultices, act powerfully in preventing glandular tumours from coming to its maturity. The greatest benefit had been derived from its application in the worst cases of compound fracture. The leaves with a few grains of camphor afford relief in rheumatism, infections of the ears, eyes and teeth. On the decline of smallpox, it was almost invariably a custom of the natives to cover the body with leaves of this tree. From its seeds acrid bitter oil is extracted, which was considered as a remedy to leprosy. Its seeds were being applied to kill insects and the kernels in powder form were used to wash hair. A gum secreted from its bark was used as a stimulant.[60]

***Bassia longifolia* (*Mohuā*):** A juice extracted from its bark was prescribed for rheumatics. The bark was also used as a remedy to itch.[61]

***Bergera koenigii* (Curry-leaf tree):** The bark and the roots were used externally as remedies to eruptions, and in infusion to check vomiting in cholera. It was used for bites of poisonous animals. Its fresh leaves were eaten raw in dysentery by the natives.[62]

***Boswellia glabra* (*Googula*):** The resin of the tree mixed with ghee was prescribed by the native doctors in gonorrhoea. The resin was burnt as incense in religious ceremonies. Mixed with lime juice or coconut oil, it was applied as a plaster in cutaneous infections as well as in cases of ulcers and bad wounds. [63]

***Butea monosperma* (*Palāsa*):** The root of the plant was ground with rice water and the paste was applied on neck to cure goiter.[64] The pounded seeds made into a paste was considered as useful in ringworm. The inspissated juice obtained from the stem by incision was known as the Beṅgal *kino* is an efficient substitute for the real *kino*. Its flowers were used as a fomentation in dysuria. Its seeds were considered as warm purgatives and also used in fevers. Its juice was used in diarrhoea, pyrosis and after parturition.[65]

***Cissus quadrangularis* (*Hādabhangā*):** It is a creeper with quadrangular stem commonly found in exposed bushes. The paste prepared out of the mixture of the plant along with ragi baked in fire to form a cake was considered as a remedy to rheumatic pains on the backbone.[66]

***Diospyros melanoxylon* (*Keṅdu*):** Its bark was an astringent and reduced to an impalpable powder, for application in ulcerations. The powder mixed with black pepper was administered in dysentery.[67]

***Emblica officinalis* (*Amlā*):** Its root was used for stomach disorders. The leaves of the plant were used for skin diseases while the fruits were used for cough, asthma and bronchitis.

***Feronia elephatum* (Wood-apple):** A transparent gummy substance exudes from its stem when cut or broken. It resembles much with the gum-*Arabic*. The powdered gum mixed with honey was given in dysentery and diarrhoea. The leaves when bruised have a fragrant smell. The natives considered them as stomachic and carminative.[68]

***Ficus bengalensis* (Banyan tree):** The seeds of the fruit were considered as cooling and tonic, which were being prescribed in the form of electuary. The white glutinous juice flows from the stems was applied as a remedy in toothache and also to the soles of the feet when cracked and inflamed. The bark was given in infusion which was considered to be a tonic. It was also used in diabetes.[69]

***Ficus benjamina* (Fig tree):** A decoction of the leaves mixed with oil was considered as a good application to ulcers. The bark of the root was boiled in water and given as a wash in pathos complaints. It was said to be strengthening the gums and to be a diuretic. A kind of *balsam* prepared from the bark was mixed with oil and applied to ulcerous infection of the ear and in deafness. A bath made from the bark of the root and stem was considered to be very efficacious in the cure of leprosy and mitigating pains in the limbs.[70]

***Globba orixensis* (*Gada*):** The rhizome of this perennial herb was rubbed on a plain stone and the paste obtained is applied on scorpion stings.[71]

***Gmelina arborea* (*Gambhāri*):** Its roots were used for the treatment of cough, rheumatism, fever, heart diseases, hallucination and intestinal parasites. The bark was used for abdominal pains, burning sensation and fevers. Its fruits were given as cooling decoction in fevers. The flowers were recommended for leprosy, skin and blood diseases. Leaf paste was applied to get relief from headache and the leaf juice was applied as a wash for ulcer.[72]

***Holarrhena antidysenteria* (*Indrajavā*):** The seeds were considered to be serviceable in dysentery, diarrhoea, fevers, flatulence and bilious affections. In the treatment of haemorrhoids, they were given in the form of a decoction made with milk. When powdered or infused with warm water, it was very useful in mild forms of dysentery, complicated with worms in children.[73]

***Mesua ferrea* (*Nāgeswar*):** The dried flowers were said to possess stimulant properties. The oil of the seeds was much employed by the natives in rheumatism. The bark and the roots are also used as an excellent bitter tonic in infusion or decoction.[74]

***Nux-vomica* (*Kochilā*):** The powdered seeds and sometimes a decoction made from them had been used in the treatment of dyspepsia and diseases of nervous system. It was used as a tonic, stimulant and febrifuge and in the treatment of harmful diseases especially in ulcers infested with maggots. Its seeds were used as a fish poison.[75]

***Pongamia pinnata* (*Karañja*):** The juice of the plant was used to treat diarrhoea, cough, leprosy and gonorrhoea. The juice of the roots was used to clean teeth, strengthening gums and treating foul ulcers. A decoction of dried flowers was given in diabetes. The oil extracted from seeds was used for scabies and soap making. The seed paste was also used to treat painful rheumatic joints, skin diseases and leprous sores.[76]

***Rauvolfia serpentine* (*Pātālgaruda*):** The root of this plant was grounded, and the diluted paste was taken orally to cure stomachache.[77]

***Santalum album* (Sandalwood):** The grounded wood with water in the form of a paste was used for local inflammation and skin diseases.

***Saraca indica* (*Asoka*):** The flowers, seeds and dried bark were considered to have medicinal properties. The pounded flowers mixed with water were given for haemorrhagic dysentery. Its seeds were used to cure urinary discharges and the dried bark was used as an astringent and also widely applied in gynaecological disorders.[78]

***Streblus aspera* (*Sāhādā*):** The leaves of the plant were used in high blood pressure; the stem was used as brushwood for dental care. Its seeds were used in hysteria and skin diseases. The natives used its roots in piles.[79]

***Syzygum cumini* (*Jāmun*):** Fresh bark juice mixed with milk was used in diarrhoea. The seed powder was used for diabetes and the bark was used for sore throats, bronchitis, asthma, ulcers and dysentery.[80]

***Tamarindus indica* (Tamarind):** The leaves were applied to reduce inflammatory swellings and ringworm. The seeds were considered as astringent, aphrodisiac and useful in simulating giddiness and vertigo. The fruits were used in diseases caused by deranged bile such as intoxication from liquors and burning of the body.[81]

***Tectona grandis* (Teak):** Its leaves were used for scabies.

***Terminalia arjuna* (*Arjuna*):** The powdered bark of the plant was used in hypertension and a decoction of its bark was used as wash in ulcers.[82]

***Terminalia belerica* (*Bāhādā*):** The fruit in powdered form was used as tonic and laxative. It was also useful for piles, asthma and bronchitis.

***Terminalia chebula* (*Haridā*):** The fruit was considered as astringent and laxative. It was used as a gargle in the inflammation of mucous membrane of mouth. The fruit decoction was used in bleeding and ulceration of gums. The roasted fruits were taken in cough. It was also used to treat chronic ulcer, wounds and scalds.[83]

4.1.7 Edible Products

There were hundreds of forest-products in the form of roots and tubers, fruits and flowers, pulps and seeds available in different forest areas of south Odisha which qualify for human consumption. The tribals had profound awareness of their usages and collecting those products for their sustenance. The forests were teemed with naturally grown fruit trees like mango, jackfruit, tamarind, *Keṅdu, bel, kaitha, tāla, Sitāphala, jāmun*, etc. Seeds of various fruits with edible kernel were relished very much by tribal people. Saps tapped from many plant species were used to quench their thirst for intoxicating drinks. *Mahu*ā flower was brewed to get liquor which they were extremely fond of. These products were available throughout the year.

Hundreds of edible wild plants occur in the forests of south Odisha. Different parts of different plants were qualified as edible products. Some of those were eaten raw, some were baked and some other were cooked. Many fruits were eaten unripe whereas, some others became fit for consumption when they ripe. Many types of plant roots bearing edible tubers were collected by digging them out. Leaves of many plants were plucked and cooked to make those fit for consumption. Pulps of some fruits were fit for consumption without cooking. Kernels of mango and tamarind were dried, ground into powder form, from which cakes or other forms of dishes were prepared by baking. The tribal had acquired knowledge on seasonality of various wild edible products like mangoes, tamarind, jackfruit, etc. The mango tree was the source of a number of MFPs. Tender and ripe mangoes were collected, the fruits were eaten while the seeds were used for starch-making.[84] Arrowroot which was a very common edible product was growing wild and extensively adapted for cultivation. Those are dug out when its leaves turn yellow.[85] Similarly, turmeric was also adapted by the tribal for cultivation as a cash crop.

4.1.8 Oil Seeds

Oil seeds are amongst the most important items of forest produce. The oils can be classified into three groups namely, non-drying, semi-drying and drying oils. The castor oil is non-drying oil. Sesame and cotton seeds fall under the category of semi-drying oil. The linseed oil was falling in the category of a drying oil.[86] Drying oil polymerize into a solid mass or a film with high tensile strength and used as varnish or paint for surface coating when applied in thin films. Once oxidized and dried through exposure to air, the process is not reversible, and it becomes virtually impermeable to water. This characteristic of the drying oils makes those products fit for use as a paint on articles made from wood.[87] Similarly, the non-drying oil, due to its physical properties was used as lubricants in wheels. Various kinds of oil seeds were collected by the tribal and oils were extracted locally for different purposes.

Sāl seed has come to prominence due to its oil content which can be commercially extracted. From silvicultural point of view some restrictions were imposed on the collection of *Sāl* seeds to build up the capital of the forests.

Rules for the collection of *Sāl* seeds

1. Collection should not be made after 15th June i.e., the onset of monsoon in the region.
2. Collection should not be made from areas which were already poor in *Sāl* regeneration.
3. Collection should be confined to fallen seeds and no attempt should be made to pluck the seeds from the standing trees.
4. Burning of the ground for preparing the seedbed was strictly prohibited.[88]

Lemongrass oil has a strong scent of lemons and was often called citronella. It was used extensively for cooking and flavouring. It was popular for its medicinal properties as an anti-mosquito agent.[89]

Oils distilled from the wood were known as wood-oil. There were only two types of wood-oils. Sandal wood oil and *Agar* wood oil. Sandal wood oil was extremely valuable and very large revenue was obtained by its sale. *Agar* wood oil was not so important from revenue point of view because only a small portion of the tree produce this wood oil.[90]

Catechu or *kathā* were obtained from the heartwood of *Acacia catechu*, a common deciduous tree found mainly in ravine tracts. The heartwood was cut into chips and were

boiled with water in earthen pots. Sometimes the liquid was poured into the other pots in which liquid of thicker consistency were boiled and this process was continued until the liquid achieved correct consistency. Finally, it was poured into an iron cauldron and further boiled and stirred until it attained the consistency of syrup, then it was poured out into wooden frames lined with leaves and allowed to cool.

Catechu was an important commercial product, largely exported and used as a dying and preserving agent. Fishing nets treated with catechu were not affected by saltwater. It was also used in medicine as an astringent.

Kathā was prepared in the first stages in the same way as catechu, but the re-boiled liquid was poured into moulds dug in fine sand which absorbs the tannic acid and leaves a residue of catchin to crystallize out into *kathā*. It was extensively used for eating with *Paan*.[91]

Mahuā liquor was obtained from the flower corollas of *Bassia latifolia*. The flowers, fresh or dry form, an important article of diet for many forest tribes and villagers living in the vicinity of the forest. From the seeds of *Bassia latifolia* oil was extracted which was known as *Mahuā* butter. The oil was extensively used for cooking purposes and for soap making. The hill tribes also used it for burning.[92] Its flowers were extensively used for producing alcoholic drink by the tribals. It was also heavily sold out to the people of non-tribal areas for similar use.[93]

4.1.9 Leaves

Several varieties of leaves of the forest were of useful applications; among which, *Keṅdu, Sāl* and *Siāli* leaves were of great economic importance. The leaves were used in various ways like edible leaves, dyes and medicinal leaves. The leaves of *Shorea robusta* and palm were used as thatching materials to cover the roofs of the houses. The leaves of *Siāli* creeper, *Sāl*, and *Keṅdu* trees were of great economic value due to its demand in the non-forest areas. Leaf utensils were made from *Sāl* and *Siāli* leaves. The *Keṅdu* leaves were used for making leaf cigarettes, commonly known as *Bìrìs* or *Bidis*.[94] All those leaves were plucked manually and after drying, those were kept in bundles in the stores.[95]

The usual practice of collection of *Keṅdu* leaves should be followed, taking care to carry out the following operations in timely manner.

1. Coppicing should commence by middle of February and completed prior to the middle of March.
2. Plucking should commence soon after new leaves have appeared and completed by the end of May.

4.1.10 Animal Material and Miscellaneous Products

Among the forest produce of lesser importance were honey, wax, marking-nuts, soap-nuts, fibres, fodder grasses, *Kamalāgundì,* ivory, *kusumi*, *Karañja* and *neem* seeds, cashew nuts, etc. A number of animal products were obtained from forests. Some of such products collected from the forests of south Odisha include lac, cocoon, honey and wax. The *Khoṇds* collected the jungle fruits from the RFs and enjoyed them as a concession. They collected jungle fruits, arrowroot, *mahuā* flowers and seeds, fibres, wax, honey, etc. and, small quantities of other products such as thatching grass, stones, metal and gravel were also collected and sold on permits.

The pods of *Acacia concinna* yield *Śhikākāi* which contains saponins was used for cleaning hair, washing silk and woollen clothes. The fruits of *Sapindus trifoliatus* known as *Rithā* also contain saponin. It was widely used for washing delicate clothes like silk and wool. The cleaning nuts like the seeds of *Strichnus* (*Nirmalā/Kataka*) were used for cleaning muddy water.[96]

Lac

Beneficial insects were one of the important economic components of the forest ecosystem. Their exploitation had been historically linked with tribal economy. Some common products like lac, silk and honey were produced by different insects and played important role in income generation for the forest dwellers.

Lac insects have a parasitic existence living on the trees. Its cultivation was not done on a large scale but collected from the naturally grown plants of the forest through traditional means. It was naturally cultivated in the Pannabeda *Muttāh* in the north-east of Nawarangpur *Tāluk* of the undivided Korāput District. It was generally cultivated on *Kusumi* tree which was otherwise known as *Kusumi* lac. Most of the tribal populations who lived in or around the forests were traditionally practicing lac culture in the absence of other cash crops.[97] Lac insects naturally grow on various host plants and get their nourishment from those plants. The most common host trees for lac cultivation are *Butea monosperma* (*Palās*) and *Scheleiahera oleosa* (*Kusumi*) besides several trees of regional importance. Three natural, renewable, non-toxic and eco-friendly products viz. resin, dye and wax are derived from the lac. *Rangeeni* and *Kusumi* are the two strains of the lac insect which contribute significantly in the lac production. Lac cultivation was an important source of income, supporting livelihood for the forest and sub-forest dwellers

of the region. The lac cultivated in south Odisha was locally consumed. The people used to mix lac with colours and applied on small cane boxes and terracotta figures.[98]

Odisha used to have a good production of lac. The artisans known as *Lakhārā, Śaṅkhāri* and *Jaurā* used to make various products from lac. *Śaṅkhā,* a traditional form of lac-based bangle was extensively used. The glass bangles were coated with yellow lac while it was hot and little bits of looking glass were also inserted. These yellow lac bangles were characteristic adornments of the women of the south Orissa. The *Lakhārā* community then had a monopoly right to collect lac. The traditional lac-based product *Altā*, known as *lākshā-rasa* in Sanskrit was prepared from lac. The *Mahārājā* of Jeypore patronized the lac artisans and hence, many artisan hamlets are still found in Nawarangpur area. A few families of the *Śaṅkhāri* caste in Nawarangpur have gained reputation by making fancy objects, such as chains, bangles and fly whisks from lac and coating nests of boxes with lacquer patterns.[99] The people of this area made lac-combs known as *Sìredy.* Apart from lac, bamboo, fabric, earthen pots and iron knives were the main materials for the lac *Sìredy*.[100]

There was a market for the crop in the Raipur district just over the river Tel, and unless it was carefully guarded it was smuggled out of the Jeypore estate without payment of royalty.[101] In Jeypore the artisans made neat little snuff boxes, about two inches long which was shaped like an almond, from fine grained red and white stones which were abundantly found in those areas. Besides the ordinary work in iron such as agricultural implements and tools, sugar-boiling pans, knives, *Tāngìs* were also made out of the native iron by the *Lohārìs* in and around Teṅtulikhuṇti village. Besides iron brass and bell-metal work were also carried on by the artisans. At Vizagpatam some firms manufactured fancy articles for Europeans such as chessboards, photograph frames, card cases, trinket boxes from tortoiseshell, horn, porcupine quills and ivory. The horn and porcupine quills were obtained from the Agency areas of south Odisha.[102]

The tribals irrespective of their age and sex were engaged in collection of forest products both for their own consumption and for sale. The products were mainly collected for food whereas other products such as seeds, honey, arrowroot, tamarind, broom grass were collected and sold in the markets.[103]

Honey

Honey and bee-wax were also collected by the people from Government forests as well as private forests. The tribal people collected honey mainly for sale. It was usually collected during January to April and wax was collected as a by-product. After honey was

procured, the hives were boiled in water. The mixture was poured into gunny bags which were placed in a pit dug in front of the house. This strained material was poured into a pan placed over a pot of boiling water. By this process the water content was steamed out and the wax deposited as sediment. The wax was procured for sale.[104] It had varied applications such as wood polishing, etc.

Tussar Cocoons

Tussar cocoons were cultivated and collected in the forests of south Odisha. It was collected from the forest which was the source of silk. The insect was a denizen of the forests of south Odisha inhabited by the tribal communities. The *tussar* silkworm feeds on *Asana*, *Arjuna* and *Sāl* trees. The cocoons were collected from the forests during the months of June and July and sold during the month of August and September. The moths emerge during the month of August to October and the laying were collected and retained for rearing. The cocoons were steamed, and sun dried before sale.[105] Besides these products, the natives also engaged in collection of brush wood, broom grass, tamarind, mango kernel, myrabolans etc. from the forests. (**Appendix-VIII**) In the Administration Report of the Forest Department of Madras Presidency for the year ending 31 March 1936, it has been mentioned that the value of the total outturn of the MFP during that financial year was Rs 5,43,683/- as against Rs 5,41,697/- in the previous year. MFP was as usual generally leased to Contractors in almost all the Divisions. But sometimes the high valued products like deer-horns, honey and elephant tusks were collected departmentally according to the provisions of the working plan.

Bamboos

In the forests of south Odisha, especially in the Ghumsar Division, two species of bamboos having commercial importance were found viz. *Sāliā* (*Dendrocalamus strictus*) and *Kaṅtā* (*Bambusa arundinecea*). The former was typically confined to the hills and hill slopes and mostly found in association with miscellaneous tree species. The growth was poorer in outer hills and southern aspects than in the slopes and on northern aspects in the Plains, especially in poor *Sāl* forests.[106] *Kaṅtā* or thorny bamboo variety was confined to the damp localities including the bottoms of narrow ravines, broad valleys, and pockets of hills and on riverbanks. The tendency of its extensive growth on a patch of land excludes other plant species in the area.

Uses of Bamboo

Bamboo had versatile applications. In the domestic front it was widely used for purposes like house construction, laying pavement or confinement around houses and agro fields, stitching of storage containers for preservation of grain, preparation of equipment for household use and for agro processing. Similarly, in industrial front its major application was in production of paper, fibres boards and similar other materials.

From economic point of view *Sāliā* bamboo was more valuable and had greater utility to the people for its wide range of application for domestic and industrial purposes as enumerated above. *Kaṅtā* bamboo was extensively used by almost every household of the locality and the adjoining rural areas for domestic applications. This single plant species contributed direct and indirect livelihood to innumerable people belonging to the poor and marginalized sections of the society who work on it as cutters, transporters or artisans.

Lease of bamboo forests for industrial purposes has received priority by the then colonial government as this ensures disposal of large lots of production at a time, thereby ensuring massive revenue to the exchequer. Bamboo based cottage industries were very common to the forest areas of the region.

The position of bamboo may be construed from two economic angles i.e. from its industrial and domestic utility value. While the industrial use has been an important source of revenue for the state exchequer for centuries, its non-industrial uses has an intimate relationship with the life of the local people who depend on it as an important source of food, medicines, house building materials and also as raw material for making bamboo ware.[107]

Young bamboo shoots are known as *Karadi* which has considerable nutritional value. Bamboo seeds locally known as *Bāunsa Dhāna* were collected by the indigenous people and used as a substitute for rice. Stem and leaves of *Kaṅtā Bāunsa* were said to be cooling laxative; and useful in burning sensations, diseases of blood, leucoderma, wounds, piles, tonic and was applied to bleeding gums and joint pains. [108] During the British period, the sale of *sāliā* bamboo was controlled, and the permits in respect of culms under one year's age was confined to the basket makers.[109] As a building material it was known as 'poor men's timber'.

Besides being consumed directly in construction work, bamboo also serves as an essential secondary material in various kinds of constructions. Bamboo mats have been processed to produce roofing sheets. Fine bamboo sticks were used as a stitching material

in leaf plates and used as core of incense sticks. Bamboo weaving was known from time immemorial. In ancient defence strategy, bamboo thickets used to act as natural barriers for intruders.[110] It was also used for preparation of bows and arrows which was a part and parcel of the tribals' life. Nevertheless, its dry leaves and stems were extensively used as fuel for cooking food.

The sub-sec-7 of sec-2 of the IFA, 1927 has recognized bamboo and cane under the category of trees. Removal of bamboos from Protected Forests was allowed in lieu of payment at the scheduled rates. This system was particularly useful when the people required a quantity beyond what was allowed to them free of cost in lieu of an annual forest cess though the rates varied from time to time and from area to area.[111]

4.2 Major Forest Product Timber

In a Press Note of Forest and Indian Industry No-F.143/2/36, New Delhi dated 14th December 1936 with the complements of the Director of Public Information, it was declared as to how forest research has assisted in the field of establishment of new industries and brought about considerable savings in the expenditure of Government Departments and business concerns making use of forest produce.

The Forest Research Institute at Dehra Dun has been carrying out research in the process of growing trees and of making profitable use of timber and other forest produces. The field of research *inter alia* includes the process of seasoning, preservation, testing and determination of the working properties of Indian timbers, the utilization of fibres, oils, gums and resins derived from the forest plants, the exploitation of bamboos and grasses for paper making as well as the cultivation and protection of the growing trees.[112]

Valuable help has been extended to Government Departments, Corporations and many business concerns for averting costly mistakes from their part which inversely resulted in considerable saving of natural resources.

For example, the East Indian Railway bought 6000 numbers of logs for coach building, without having knowledge whether the logs were of the specified species fit for that purpose or not. The help of wood technologists was sought, and it was found that over 15% of the logs had been supplied under false and improper nomenclature. Similarly, the Eastern Beńgal Railway undertaken some of their slipper end verification and found that most of those supplied to them were not of genuine standard. Both the railways then realized the importance of ensuring the specification of the species before its procurement and in this connection, references were frequently made to the Institute seeking its technical support in similar situations.[113]

Seasoning of timber

An essential process of efficient utilization of timber is the adoption of proper methods of seasoning. The methods to prevent the green logs from degradation and borer attacks during their logging, extraction and of staking have been worked out. For this purpose, air seasoning of green logs was considered to be the best and cost-effective way and performed through staking of the logs in a specific manner allowing maximum aeration to the individual segment. The research done in the seasoning session has succeeded in developing a simple and economical process of kiln drying. All the kilns installed in the province were erected according to the designs and specifications furnished by the Institute.

As a result of the introduction of proper methods of air and kiln seasoning, cheaper woods were displaced more than half of the more expensive teak used during 1920s in the construction and repairs of railway carriages.[114]

There were few raw materials like wood which possessed extensive powers of adaptability and were thus, largely used for industrial purposes. Wood may be classified according to the manner in which it was used, as timber and firewood. In timber, the dimensions and shape of a tree and its individual technical properties were of paramount importance and decided by keeping in view the purpose for which it was intended for use. As regards to firewood, however they were of little importance and unfit for any other purpose, that was used as fuel.[115]

Timber may be classified according to its form, adaptability and mode of conversion and this classification naturally precedes the account of different wood industries. Thus, logs may be distinguished from sawn or cloven timber. Logs are pieces of timber which retain the full thickness of the stem but may be shortened. In the sawn timber, length of the piece is generally of greater importance than their breadth. Cloven timber comprises all those sorts of timber in which the wood is split or cloven along the direction of the fibres. In this class of wood, the wood preserves its natural elasticity and strength and is much less permeable by liquids and less liable to warp and crack then sawn timber.[116]

Wood is used for various purposes. Teak wood employed in shipbuilding is more durable and it does not rust iron nails and bolts because of the absence of tannic acid in the wood.[117]

Indian wood for gramophones

Kiln seasoning adopted by commercial farms had resulted in an increased use of Indian timbers in preference to the imported kinds. Indigenous woods supplied for the manufacturer of gramophones and wireless cabinets was a classic example and the Indian woods very softly replace entirely the imported woods formerly used for this purpose.[118]

Wood preservation

Commercial wood preservation was a powerful industry. The Railway Department was saving over Rs. 3 lakh a year over their previous expenditure figure on sleeper treatment by adopting the process invented by the Institute, which was a direct outcome of its research. A pointed reference to this work, including the saving, was made by Sir Girija Shankar Bajpai in the Legislative Assembly during the budget session of March 1931. A staggering 50% more sleepers could be extracted from the same volume of trees yielding before the invention of empirical process of wood-preservation.[119]

A new discovery of that time was the wood preservative *ĀSCU* that had been found to be superior to other known antiseptics and was adopted by a special committee appointed by the Railway Board. *ĀSCU* is a special preservative which is available in powder form. It contains hydrated arsenic penta-oxide, copper sulphate or blue vitriol and sodium dichromate or potassium dichromate in certain proportions. It was to be dissolved in water to form a preservative solution. After applying *ĀSCU*, the timber can be coated with paint, varnish etc. It is useful mainly to get rid of from white ants.[120]

Pressure treating of plants using *ĀSCU* had been put up by the Madras and Travancore Government. The process was used for the preservation of telephone poles and for high tension lines used in hydro-electric schemes. The invention of *ĀSCU* has made it possible for indigenous timbers to compete with steel, iron and concrete for structural purposes. For conditions where preservatives cannot be used to prevent damage by borers and white ants, remedies have been devised which were cheap and effective and had done much to reduce losses from rejections in the furniture and timber trade, in packing box, and in match and plywood industries. It enables the manufacturers to deliver clean and borer-resistant materials. The Institute also assured the public that white ant proof buildings could be erected in India as well. Scientific strength testing has led to the discovery amongst Indian timber of several good substitutes for imported woods used in many industries. Tool handles, picker-arms, bobbins, shuttles, sports goods, ply woods, etc. could be manufactured from local timbers.

The establishment of Turpentine industry owed much to the pioneering work done in the laboratories of the Institute. The manufacture of *Kathā* and Kutch, Santonin, Ephedrine and similar produce from forest plants were also the result of the chemical research conducted by the Institute.

The bamboo also purified for use in the production of fibres, which became a stable fibre like rayon produced from wood-pulp. Such fibres became a keen competitor to long staple cotton and altered the complexions of the textile industry[121]

4.2.1 Utilization of Timber

The Ghumsar forests came under official administration during 1850. But for this region, till the year 1890 there was little efforts made for silvicultural treatment. In 1851, the first attempt to turn the forests to accounts was made by Mr. G. Williams who entered upon a contract for railway sleepers. Although the timber quality collected through the contract was found to be superior, yet the contract with him was not effective and failed. In 1855-56, a large quantity of *Sāl* reportedly felled for the Commissariat Department. In 1858, the Collector, Mr. W. Knox, urged the introduction of measures for economy and preservation of the forests, and issued orders against the indiscriminate felling of trees. He emphasized on extension of plantation to meet the demand of timber by the towns and larger villages. At this time, the forests had not been systematically examined and means of communication within the forest regions were few. The road from Berhampur to Russellkoṇdā had been made but the extension to Bālligudā, in westerly direction had been cleared only as far as Durgāprasād. In 1859, the Conservator, Dr. H. Cleghorn toured in Ghumsar and recommended the appointment of Overseers to superintend felling of *Sāl* timber, the floating as rafts to Gañjām and subsequent shipping to Madras. A forest tax was instituted in 1861. In that year, Mr. John Brown was appointed as Overseer in charge of the Ghumsar forests. He submitted a report on the character and extent of the forests to the Conservator in 1863. In his report, he stated that forests were already denuded of fine timber owing to the unrestricted onslaughts of the public, previous to the imposition of the forest tax and lack of sufficient protective establishment.[122]

In 1864-65, 1000 *Sāl* logs were felled and brought down to the coast for transport to Madras. In addition to this, timber worth Rs. 2,990/- was purchased by the PWD, who, for the first time, were called upon to pay the value of the timber. In 1866, the year of severe famine, Mr. Maccally submitted a report to the Conservator, Captain Beddome, in which he mentioned the increasing difficulty of obtaining large sized timber and the way in which the Buguḍā and Ronabha (i.e. Rambhā) *Zamìṅdāri* Contractors sold inferior

quality *Sāl* logs to the Government. During that year, 1,143 numbers of *Sāl* logs were carted to Russellkoṇdā. Some of those subsequently reached the depots in Askā and Gopālpur. Timber for the Berhampur jail and the Askā bridge was supplied. Great difficulty was experienced in rafting of the consignments and some of the timber never reached its destination. An attempt to float 72 large logs from Kukulubā towards Russellkoṇdā was also failed. During 1868-69, *Sāl* timber was supplied for the works in Berhampur Jail, *Munsìf's* Court and *Tāluk Cutcherry*, Chilikā canal, Gañjām Jail, Sompetā *Cutcherry* and roads. In 1869-70 the Collector issued orders to protect the forests from encroachments by cultivators and a list of protected trees was again circulated. The Superintendent of the Madras Harbour Works negotiated for the supply of 6900 *Sāl* slippers. In 1880, a suggestion was approved by the Conservator to lease the Koradā and Rambhā forests to put a stop to the theft from Government forests but was not carried out.[123]

In 1883-84 Mr. Gamble, the Conservator of Forests, made a long tour in Ghumsar and advised the reservation of certain blocks of forests. Forest Settlement was made in the next year. Grazing restrictions were introduced in 1886-87. In 1887-88, part of the Vizagapatam forests was placed under Mr. Lushington on account of shortage of officers. The forests were divided into east and west Ghumsar Sub-divisions and the headquarters of the DFO was shifted from Russellkoṇdā to Chatrapur. In 1888-89 a few of the reserves were thrown open to free grazing, on account of drought and want of pasture.[124]

In 1890-91 Mr. Battie took over charge from Mr. A. W. Lushington and sleeper operations were put to a stop as they resulted in pecuniary loss and waste of timber. The prices recovered from sleepers supplied from April 1889 to June 1900 have been furnished in the following table: -

Table 4.1: *Price of Sleepers*

Sl. No.	Number and Description	Value (Rs. A. P.)
1.	1936 *Sāl* sleepers (10 feet) @ Rs.3-6-0	6,534-00-00
2.	270 *Sāl* rejects (10 feet) @ Rs.2-6-0	641-04-00
3.	9733 *Sāl* sleepers (6 feet) @ Rs.1-2-0	10,949-10-00
4.	*100 Sāl* sleepers (6 feet) @ Rs.1-14-0	187-08-00
	Total:	18,312-06-00

Source: M. K. Nayar, *Revised Working Plan for the Ghumsar Forests, Gañjām District, 1930-31 to 1939-40*, p.188.

The timber that was left lying in the Ghumsar forest was taken to Russellkoṇḍā sale depot. A total of 2,677 numbers of trees were felled for fuel and 222 numbers for timber purposes, and 946 numbers of trees for fuel purposes were rafted to Askā Factory and sold for Rs.2, 031/-. An *Anicut* being put across the Rushikulyā river put a stop to further operations of rafting up to the coastline. In 1891-92 the collection and record of statistics of yield of revenue for each reserve forest area was started. Plots were selected to determine *Sāl* growth. Eight hundred acres of climber cutting in Gāllery and Chaṅdragiri reserves was done. In the same year 839 numbers trees were felled in order to prevent their destruction by extension of cultivation, and 3,852 numbers of logs felled in previous years and left lying in the forest were carted to sale depots.[125]

In 1900-01 sleeper operations were suspended. In the Ghumsar forests, fire protection was introduced for the first time and four-square miles were successfully protected at a cost of Rs.64-12-0 per square mile. For about 50 years, after the Gañjām forests came under the British administration, they were subjected to an intermittent series of exploitation crusades as the demands of the market or the uncontrolled zeal of revenue and departmental officers dictated. A succession of heavy annual felling aggravated by the importunities of sleeper contractors was followed by years of inaction during which usually no attempts were made to rectify the previous reckless policy by cultural or protective operations. During this period the administration was busily engaged in reservation, selection, demarcation, roadmaking and rest-house construction and very little attention was paid towards the conservation of forests. Rather illegitimate revenue was obtained from the forests and very little expenditure was incurred on their improvement. No protective measure was attentively taken resulting in drastic deterioration of the value of these natural assets. The forests had been managed with an objective to get quick financial results and not under sound silvicultural principles.

The following figures show the surplus at which the district of Gañjām was run for the period of ten years from 1892-93 to 1901-02:

Table 4.2: *Surplus value of timber*

Sl. No.	Year	Value in Rs.
1	1892-93	2,380.00
2	1893-94	82,810.00
3	1894-95	3,869.00
4	1895-96	8,375.00
5	1896-97	3,475.00
6	1897-98	8,493.00
7	1898-99	21,820.00
8	1899-1900	11,659.00
9	1900-01	12,816.00
10	1901-02	33,691.00
Total:		**1,89,386.00**

Source: *Revised working plan for the Ghumsar Forest, Gañjām District 1930-31 to 1939-40*, p. 190.

In December 1907, the first fuel coupe in Ghumsar was started at Mujāgada in Bishnuchakram Reserve. A rest house without-houses was constructed. The Government ordered the closure of all reserves to permits vide G.O. No. 2534, Revenue, dated 10th Sept. 1908 and introduced a coupe system to meet the local needs of wood. It was not intended to compete with private forests. In lands outside reserved forests, the indent system was sanctioned for 14 best spices of timber trees viz. *Sissuā, Piāsāl, Bheru, Bāndhano, Sāl, Holondo, Kusumo, Sahaja, Kosi, Soropatri-Mohi, Gangadi-Mohi, Arjuna and Dhau.* A standardized Cubic Feet rate was prescribed for such timbers. The Government in that year remarked that "Forest Administration in Ghumsar had been allowed to get into a most inefficient state; for in order to realize small revenue the Forest Department has been competing with private owners to the detriment of the forests and selling its produce at unduly low rates. If as stated by the Collector, there are extensive private forests from which supplies are obtainable, the Government forests should have been closed and preserved instead of being denuded for the purpose of competition." [126]

In the succeeding years the question of introducing a forest *Paṅchāyat* system for certain suitable preserves was considered. No *Paṅchāyats* were actually formed as the villagers were not sufficiently advanced to manage reserves for themselves in the manner recommended by the Forest Committee. A determined attempt to initiate the system in Sondasoliā Reserve was made by the Collector and the DFO. The people were not oblivious of the advantages of maintaining forests on the hill sides but had no desire for taking the responsibilities. The future of the un-reserved forests was given special attention. Owing to their shape, situation, the profuse nature of the tree, it has been found in practice most difficult to protect the un-reserves unless large special staff were to be engaged for the purpose. It was therefore decided by the Collector and the DFO that throughout the un-reserves marketable trees should as far as possible be extracted by the Forest Department. The selection of *Sāl* areas for reservation was commenced.

The interim WP provided for extraction of timbers from un-reserves of the 7 Ghumsar Ranges according to a defined program. Trees of 4' 6" in girth and upwards were felled departmentally and were converted into sleepers and scantlings for supply to the Munitions Board, to M/s. Bird and Co. and to the PWD in Vizagapatam for construction of a new hospital. In this respect the provisions of the interim WP were exceeded. Instructions had been received from the IG to cut railway sleepers urgently in spite of WPs owing to the exigencies of the war. Timber of un-reserves proved to be unsuitable for slipper operations and the additional felling in reserves were necessitated to enable them to fulfil their promises in the way of sleepers.[127]

About 270 candies (500 *lbs*) of *nux-vomica* were sold at Rs 12-08-0 per candy as against 500 candies sold at Rs 16-10-0 per candy in the year 1935. The demand for tanbarks like *Cassia fistula* was poor. The removal of *kivan* fibres (*Helicteres isora*) was leased during the year 1936 as the fibres were reported to be the best of its kind for the manufacture of gunny bags and even superior to jute and *sisāl* hemp.[128]

The estimated value of forest produce removed by the free grantees and right holders amounted to Rs 97,014 as against Rs 93,032 during the previous year i.e. in 1935. The free grantees were generally made for the reconstruction of houses destroyed by floods or fire. The principle governing the free grants was followed in sanctioning them, namely, that they should be restricted to deserving cases of poverty and sudden calamity and should be made from unreserved as far as possible and from reserves only in the absence of unreserved forests in the vicinity.

As far as possible the domestic and agricultural needs of the people were supplied from departmental forests. As usual, free grants of building materials were allowed for reconstruction of houses destroyed by fire. In several Divisions tenants could cut and remove fodder and thatching grass by head-loads free of charge, and the privilege was extensively availed by the people. Free grazing and grazing at concessional rates were allowed in localities where there was a scarcity of fodder. The coupe contractors were required to fulfil the fuel and other small timber requirements of the tenants at the coupes at rates not exceeding the maximum rates fixed by the DFOs and the fact was also notified in the District *Gazettes*. The working plans have provided agricultural implement coupes and brush-wood coupes for local supply but the same was not functioning in an effective manner. Brake poles were supplied to the cart-men on the roads in *Ghāts*. The fishermen were also supplied with timber required for the construction of fishing boats and catamarans. The demand for forest manure was decreased considerably because of the farmers had learnt either to grow or to resort to the *Paṅchāyat* forests for them.

Raw materials required for local cottage industries were supplied by the Forest Department from adjoining forests. Softwoods were supplied to the slate manufacturers. In Kurnool South a fuel coupe of ten acres was sold to the temple trustees of Mahānadi for the supply of fuel to the pilgrims visiting the shrine during the Ś*ivarātri* festival.

The Forest Utilization Officer continued to organize special sales of logs, sleepers and the development of minor forest products. Since February 1936, auction sales in the timber depots were conducted by the respective DFOs in order to enable the Forest Utilization Officer to devote more time to the other important items such as the study of market conditions, extension of the use of woods both by proper seasoning and the use of wood preservatives, development of lac and other works such as propaganda for public awareness etc. The turnover of the Division for the year 1936 was increased to Rs 6,20,998/- as against Rs 5,52,634/- in the previous year. The increase in revenue was mainly due to the supply of a larger quantity of hardwood sleepers to the railways.[129]

The timber market showed the signs of improvement even though the prices did not rise appreciably. Most of the Teak logs were used for conversion into special sized sleepers for the South Indian Railway. The timber in other depots was sold through public auctions. Sales from all the four important departmental depots by the Forest Utilization Officer were aggregated to 251,820 cubic feet against 335,825 cubic feet in the previous year i.e. 1935. The all-round average rate realized during the year 1936 was Rs 1-8-9 per cubic foot against Rs 01-08-5 per cubic foot in the year 1935.

Under the three-year contract entered with the Chief Engineer, South Indian Railway, 30,270 B.G. and 18,963 M.G. non-teak hardwood sleepers were supplied during the year 1936 at rate of Rs.06-00-00 per B.G. and Rs.02-12-00 per M.G. It was followed by a further contract for the supply of special sized Teak sleepers for a term of two years commencing from April 1935, which was accepted by the South Indian Railway and 17,509 sleepers of 60,206 cubic feet valued at Rs.1, 89,139 were supplied during the year.

The PWD and the Jail Departments were not able to purchase all their timber requirements from forest department; the chief reason for it was the high railway freight which they required to pay on its transportation. About 7,850 cubic feet of Teak and 1,507 cubic feet of *Asana* (*Terminalia tomentosa*) were sold to various departments of the Government and the total value of the above sale was Rs.19, 681-03-00.

The FUO made joint inspections with the representatives of railways of the treated and untreated sleepers of various types of logs which were placed on certain specially chosen test lengths of the railway line for observation.[130]

The Forest Department continued to look after the interest of the aboriginal tribes dwelling in the forests. The hill tribes in the Agency tracts were allowed free removal of forest produce for their own use, free grazing for their cattle, free hunting and free *Poḍu* cultivation in unreserved forests. In return for these concessions they were required to assist the department in fire protection and by providing labour for which they were adequately paid. In the Bālligudā Agency the system of entrusting the duty of protection of specified areas to the *Pātros* and remunerating them at the rate of Rs.04/- per square mile had satisfactory outcomes.[131]

The forests in most of the Agency areas were under the Forest Adviser of the Agency, Mr. Mooney. These Agency areas had their own localized WPs. Generally, the forests were divided into 'A' class reserves, where reservation was absolute, 'B' class reserves which were meant for *Nistār* of the villages and were worked under a coupe system and at the third place the village forests which were known as *Kẖesrā*. Village forest was an area covered by forest rules and managed by forest officials whose jurisdiction extended to the cultivated holdings. The reserved species were usually reduced to the timbers and some fruit trees and lac bearing species. The reservation applied throughout the State to cultivate fields, to waste lands and village forests, as to reserve forest. Usually the fee charged on the cultivated fields and village forests was half to that of the royalty which would otherwise be paid to *Nistār* or forest cess payers. There was probably uniformity in administration in respect of reserved species in the *Zamindāri*

forests as well. In return for the *Nistār* or forest cess, cultivators were entitled to take unreserved species free of charge for their own purposes from village forests or 'B' class forests. Where there were no village forests or 'B' class forests, the cess was abolished in those villages. In addition to free fuel, the villagers were allowed to take reserved species on payment of a cess at half of the rate of royalty assessable on the same. Timber for agricultural implements was also allowed to the locals free of charges. Grazing was not charged for agricultural cattle in the village forests and in 'B' class forests. Since 1938 the tenants enjoy the increased facilities in the forests.[132]

The monopoly leases granted for collection of forests, such as lac, *tussar* cocoons, *Keṅdu* leaves, *Haridā* with other myrabolans, hides and skins affected the interest of the cultivator. Lac was propagated on *Palās* and *kusum* trees which often found in large numbers in village waste and cultivated holdings. *Keṅdu* leaves, used for making *Bìdìs* were often found growing on cultivated holdings. Myrabolans were occasionally found on fields. Hides of village cattle were also included in the monopoly.

All these commodities were leased out to contractors who get the sole right to purchase, collect or export them undermining the natural rights of the local people. The lac contract was occasionally varied by a system of licensed vendors and by departmental collections.[133]

4.2.2 Markets and Marketable Products

Practically, the entire output of forest produce from the Division was consumed within the districts of Gañjām and Korāput including the area that formed a part of the Vizagapatam District. Within the Division itself the principal markets in those days were Berhampur, Russellkoṇdā, Soradā, Askā, Chatrapur, Gopālpur and Ichhāpur townships. Prior to the opening of the Raipur-Vizianagaram section of the Beṅgal-Nagpur Railway a lot of timber from Ghumsar used to be exported to Vizianagaram and its neighbourhood but it was then ousted out of those markets when timber was started to come from the forests lying on either side of that section of the railway.[134]

The Russellkoṇdā sawmill handled the entire output of big *Sāl* timber from the forests of Ghumsar but after the mill was closed down, the private contractors and timber traders resumed the handling of Ghumsar timber. The main marketable products from the forest were timber, poles, firewood, bamboos and other MFPs. The main timber growing forests of the Division being situated at a considerable distance from Berhampur i.e., the nearest Railway Station, the products therefrom were under a severe handicap in reaching foreign consumers at economic prices.

Sāl has always been the most important timber species. The other species for the timber of which there was appreciable market were: *Petrocarpus marsupium* (*Piāsāl*), *Adina cordifolia* (*Holondo*), *Dalbergia latifolia* (*Sisoo*) and *Gmelina arbora* (*Gambhāri*). There was some demand for *Terminalia tomentosa* (*Sahaj*) but during the period it was not easily marketable.[135]

Practically all timbers were extracted in round form. Sawing at the source inside the jungle was unknown in the district. Smaller sized logs were more in demand locally than bigger sized ones; the latter were mostly carted to Berhampur where those were either consumed locally or exported to other centres. No timber was extracted in the form of railway sleepers. The non-existence of jungle sawing was a serious obstacle to the economic exploitation of big sized trees from remote and hilly localities. The main timber species available in the Division and their chief uses were mentioned in the following table.[136]

Table 4.3: *Uses of Timber*

Sl. No.	Botanical Name	Odia Name	Uses	Remarks
1.	*Adina cordifolia*	*Holondo*	Palanquins, rafters, planks, shingles, furniture, dug outs, etc.	Extensively used locally and exported to Berhampur
2.	*Anogeissus acuminate*	*Pasi*	Dug outs	
3.	*Anogeissus latifolia*	*Dhau*	Axles and ploughs	The Odias have a prejudice against this tree but used pole sizes for axles. Exported to Vizagapatam.
4.	*Bassia latifolia*	*Mowlo* or *Mohuā*	Cattle troughs	Cattle were supposed to relish their best when given in those troughs.
5.	*Bridelia retusa*	*Kosi*	Poorer classes of house building.	Said to be resistant to white ants and fire.
6.	*Bursera serrata*	*Soropotri-mohi*	House building and door frames.	

7.	*Chloroxylon swiotenia*	*Bheru*	Fancy boxes, rice pounders, yokes	Timber of any considerable size was rare.
8.	*Cleistanthus collinus*	*Korada*	Rafters, poorer classes of house building and better class thatch bungalows	Hard, durable and resistant to white ants. Grows in any sizes
9.	*Dalbergia latifolia*	*Sissuā*	Furniture	Large straight timber was rare.
10.	*Diospryos melanoxylon*	*Kendu*	Furniture, scales, beams, rulers, walking sticks	Trees were generally faulty. Proportion of heartwood usually small.
11.	*Eugenia jambolana*	*Jāmu*	Planks, door frames.	Fruit of one variety was eaten.
12.	*Gmelina arborea*	*Gambhāri*	Palanquins, yokes, furniture, motor bus bodies	Trees were rare, but find a ready sale to carpenters in Berhampur
13.	Grewia latifolia	*Dhāmano*	Axe handles, *Kondh* cots, *Kavadi* sticks, cross pieces of cart frame	A strong and flexible wood.
14.	*Lagerstroemia parviflora*	*Sidha*	House poles and rafters.	
15.	*Ougenia dalbergioides*	*Bāndano*	Wheel boxes	Large straight timber was rare.
16.	*Pterocarpus marsupium*	*Piāsāl*	Door frame, planks and furniture.	Seldom available in plank over 1 foot in breadth
17.	*Schleichera trijuga*	*Kusumo*	Oil churners, sugarcane grinders, ploughshares and axles.	
18.	*Shorea robusta*	*Sāluā*	For building purposes, sleepers, posts, spokes, cart frames, ploughs	There was a greater demand for sale than for

			and all purposes for which strength and durability were required. It was not well suited for planking less than 1.5 inches in thickness owing to its tendency to warp.	all other timber combined.
19.	*Soymida febrifuga*	*Somi*	Temple building, troughs for cattle, rice pounders, *Garuda stamba* in tanks, well curbs.	
20.	*Mitragyana parvifolia*	*Mundi-mundi* (*Kadamba*)	Planks	Often passed as *Holondo* but inferior to it.
21.	*Terminalia arjuna*	*Arjuna*	Dug outs and house buildings	Dug outs last about 3 years. Exported to Vizagapatam and passes off as *Sahajo*. Highly resistant to white ant attack.
22.	*Terminalia tomentosa*	*Sahajo*	Building purposes, not used in contact with earth	Not much used locally but exported.

Source: *Revised Working Plan for Reserved Forests of Chatrapur Division, 1940-41 to 1959-60*, pp.35-37.

The forest area in the southern district of Korāput, was an important source of *Sāl* timber. A large number of sleepers were sourced from the district for Railways. Teak, bamboo and other miscellaneous species in Motu and Mālkāngìrì ranges were transported to Rājahmundry along the rivers Sabari and Godāvari. Bamboos of Gudāri range were floated along the river Vamśadhārā to Andhra Pradesh.[137]

Bija (*Petrocarpus marsupium*) in the shape of toughly squared spokes, fellows, etc. were transported to Andhra Pradesh from Bissamcuttack, Rāyagaḍā, Gunupur and

Gudāri ranges. The residual wood was used by the local population for construction and other purposes.[138]

In Korāput there were four main timber leases, of which the most important was that assigned to Messrs. H. Dear & Co. They were granted rights for extraction of sleepers from the *Sāl* forests in Nawarangpur, Jeypore and Mālkāngìrì *Tāluks* for a period of twenty-five years beginning from the year 1922. During 1935-36 this Company extracted 74,304 BG sleepers, 29,477 MG sleepers and 130,796 cubic feet of Specials. A four year lease was granted in 1936 to Mr. H.Tulloch for the Bissamcuttack and Gudāri ranges, a five years' lease with effect from 1937 was granted to the Beṅgal Timber Trading Company in the Rāyagaḍā and Gunupur ranges. A ten years' lease with effect from 1937 was renewed in favour of the existing lease holder, Sri D. Venkataramaya for Mālkāngìrì, Motu and Rāmgiri ranges.[139]

Poles of *Sāl* were mostly used for building of houses for its durability. The other species, which the people used locally were *Karada* and to a lesser extent *Siddha*. Poles were available practically everywhere in the Division, but the same were extracted only from comparatively accessible areas for logistic reasons.

The demand for firewood was purely local and limited to the requirements of the villagers living around the vicinity of the forest area. Owing to its bulkiness and consequent high transport charges and the remoteness of the main sources of supply from the rail heads, it was not considered economically viable to export firewood to distant markets. Within the Division itself, the distribution of forests was such that, whereas the available supply of firewood from the outlying Blocks in populous localities including the Mohiri hills hardly matched its demand within the area, the produce remained practically unexploited from the bigger and less accessible Blocks.[140]

Very little charcoal was manufactured owing to the fact that there were no industries like lac in the Chatrapur Division requiring large scale use of charcoal. The local people preferred firewood in comparison to charcoal for domestic cooking purposes. So, local demand for charcoal was very limited. Supply of charcoal to foreign and distant markets like Calcutta was ruled out on the score of cost alone. Chatrapur failed to compete with other sources of supply for such products which were more favourably situated.

The demand for bamboos was also purely local. Taking the Division as a whole, its supply exceeded the demand, but the surplus bamboos could not be made available to outside consumers at economic prices owing to high transport costs involved in it. *Sāliā* bamboo was more abundant and used universally for the purposes like housebuilding, mat

and basket-making which was a flourishing industry at Bellagunthā. A limited quantity of *Kaṅtā* bamboo was used for construction work and fencing. It was believed that *Kaṅtā* bamboo was more liable to attack by weevils.[141]

Demand for MFP from Ghumsar forests (Buguḍā and Soradā ranges) other than those removed by local *Khoṇds* as free concession for their domestic use, was not appreciable. Bark of *Cassia fistula* (*Sunārì)* and *Sabāì* grass were the only items that leased out which was used locally for tanning purposes. A variety of MFPs such as mango, tamarind, *amlā*, wood apple, guava, *Mahuā* (flowers and seeds), brooms, honey, wax and others were leased out annually from the reserved and unreserved forests of Chaṅdragiri range fetching a revenue of about Rs 500 per annum.[142] In the District of Korāput, from among the MFP, tamarind was exported to Vijayawada of Andhra Pradesh, myrabolans to Bombay and thence to America. *Addā* leaves were exported to Andhra Pradesh, *Sabāì grass* to Ticaghur Paper Mills and *Bìdì* leaves to the southern parts of Madras State. As regards other produces, *mohuā* flower was used for distillation in Korāput district, *kathā* was transported to Bolāngir, lac to Calcutta, barks to Madras, brooms to Bombay and the rest were partly consumed locally and partly exported to Sālur of Andhra Pradesh.[143]

4.2.3 Lines of Export of Timber

Railways: The Calcutta-Waltair section of the Beṅgal-Nagpur Railway was carrying out bound forest produce from Chatrapur Division.

Roads: The Division was well served by a network of metalled roads maintained in fair condition by the Gañjām District Board. From the forest point of view, the most important roads were as follows:

1. The Kurcholi-Askā road (28 miles)
2. The Russellkoṇdā-Askā road (25 miles)
3. The Gāzalbadi-Askā road (35 miles)
4. The Luhāgudi-Berhampur road (36 miles)

The Mohuri hill reserve was connected with Berhampur town by the Berhampur-Khoṇdalabandha road, a part of which was maintained by the Forest Department and a part by the District Board. The road was in a bad condition. The other District Board roads were the Russellkoṇdā-Soradā link road and that running from Jagannāthprasād to Bāllipadara via Bellagunthā. The Agency authorities maintained one or two fair-weather roads on the Sānakhemundi plateau which were useful for extraction of forest-produce from Guimerā and from Chaṅdragiri Block area. The numerous cart-tracts that traversed the plain portion of the Division served as feeders to the main roads. Portions of

Pondākhol, Kāliāmba, Chaṅdragiri, Guimerā Blocks were ill-served by roads and extractions paths.[144]

Rivers: None of the rivers of the Division was of much use for the purposes of floating. The depth of water even in bigger rivers like the Mahānadi and the Rushikulyā was too low for floating purposes except when they were in spate during the monsoon. But these spates when they occur were so sudden and last for a short time that any long distance floating down to the coast or to railheads became a prohibitively expensive operation. Floating difficulties were further aggravated by the *ānicuts* constructed by the PWD for irrigation purposes. An experiment carried out in Russellkoṇḍā Division in the rains of 1937, showed that floating of forest-produce over long distances across *ānicuts* was absolutely not an economic proposition. Another experiment during 1937-39, carried out in Chatrapur Division indicated that short distance floating down the Rushikulyā river could be undertaken with chances of success provided that the course was free from *ānicuts* and that timbers intended for floating were obtained from forests within easy excess of the river.[145]

The increasing importance of forest i.e., timber based revenue led the British rulers as well as the Princely Estates to reserve or notify more and more areas as forests under various forest laws and rules exerting restrictions upon the tribes freely using these forests from time immemorial. Restrictions on shifting cultivation on areas designated as forests were one of the key strategies for increasing the commercial value of these lands. The restrictions were often instrumental in sparking tribal unrests. The takeover of the forest lands by the state largely took place consequent to non-recognition of customary tribal land rights over these areas. The notifications regarding forests were carried out without proper survey and settlement of even without appraisal of the recognized rights of permanent cultivation practiced by the tribals on their lands. For example, an area of 1615 square miles under the Jeypore *Zamìndārì* was declared as RLs and PLs by 1939, as those lands were no more required by the estate, without any settlements of the rights of the cultivators before issuance of such notification. In these RL and PLs, cleaning of land for shifting cultivation was expressly forbidden. No survey and settlement of pre-existing rights were taken up on RLs and PLs. Similar restrictions on shifting cultivation were imposed on the lands notified as forests in all other areas of Odisha.

The tribal faced loss of land on two accounts i.e. the lowlands and the paddy-lands held under the private ownership were lost due to influx of non-tribals and at the second place the withdrawal of their rights by the state consequent upon the instances of

their indebtedness and inability to pay land revenue. The scope of shifting cultivation was lost due to notification declaring the lands as Government lands. Both these processes were aided by expansion of state and markets into the tribal areas. However, the diverse land administration provided some space for customary rights on lands of tribal, either due to the land tenure system or due to poor ability of state machinery to remote areas.[146]

In Rāyagaḍā and Gunupur areas, both paddy land and *Dongars* or the shifting cultivation lands of the *Khoṇds* and other tribes were assessed by the Jeypore *Zamìṅdāri*. Although neither of the Forest Acts that is MFA 1882 and IFA 1927 explicitly allowed shifting cultivation, yet forest rules framed by the *Mahārājā* of Jeypore provided for shifting cultivation through the Jeypore Forest Rules on forest category called unreserved lands after obtaining permission from the concerned Collector.[147]

From the utilitarian point of view, the life in the hilly forest terrains of south Odisha has a rich legacy of knowledge and practice in use of the forest produce. Application of certain plant extracts for medicinal purposes with yester years' primitive knowledge is still being recognized as effective remedies for several ailments. Similarly, barring the timbers, several other minor forest-produces have a wide spectrum of usages in household and industrial application thus playing a potential role in the national economy.

When the present condition of the inhabitants of the tribal region is merely a function of their overall position prevailing at pre-colonial period in one hand and the impact of restrictions imposed upon them through various legislations in the other, it opens a scope for further research about the historical reasons responsible for their present abysmal state of socio-economic stagnation.

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