

Forests Wealth and Pulpable Woods

By Sagar Singh*

1. A glimpse of daily life :

More often than not, a town dweller gets up from his wooden bed, leans to wear bathroom chappals, generally of rubber, made from the latex of rubber plant, brushes his teeth with a brush having a plastic handle, and then concentrates for a while on a news paper, all manufactured from forest produce. In the meantime the housewife is ready with a cup of tea and some tasty edibles, often cooked with the aid of fuel from the forest. Then a march to the office with a leather bag in the hand, (tanning material for leather derived from the barks of several forest species) follows. In the office fashioned wood provides a place for sitting and writing in the form of chair and table, made good looking and bright with varnish and polish having lac, turpentine and gum as their major constituents. Lac is an excretion of an insect developed on some particular forest species like *Butea frondosa*, *Schleichera oleosa*, *Zizyphus* species *Maghanea macrophylla* etc., turpentine is a derivative of wood resin of *Pinus longifolia* (chir) and gum is naturally exuded from several tree species. In the office one lends indication of farewell to outsiders with an offer of "Pan", having supari and kattha as its main ingredients. Supari is the fruit of a cultivated wild plant *Areca catechu* and source of kattha is the heart wood of *Acacia catechu* (Khair) trees. Exchange of puff of smoke through "Lion Brand Bidis" owes its existence to the leaves of *Dispyros melanoxylon* (Tendu) collected from the forest.

2. Productive value :

In the development of modern India, under the five year national plans, river valley projects, electricity schemes, extension of communications,

defence and other industries, all incline heavily to rest against the produce of forests.

For internal transport main body of trains and trucks are made out of wood only and likewise for external propagation of trade, export and import through ships, wood plays an important role in their manufacture. Aeroplane flies high with the aid of propellers, often made of the lightest wood *Ochroma lagopus* (Balsa). Soldier, the great, watches our frontiers with portable weapons, having their butt ends made out of special wood of walnut tree (*Juglans regia*). Many a devotee offer trifoliate leaves of *Aegle marmelos* (Bel) and 'Tilak' of *Santalum album* (Chandan) to pay homage to the gods. These plants are a part of forest community.

A newly born child starts life in a wooden cradle, grows older under the shade of woods and finally treads over his last march of journey of life on a couple of jointed pieces of wood only. Thus wood is the greatest accompaniment of human life.

Fibrous matter of several trees which used to be a body-cover of the primitive man is the fashionable rayon grade fibre of the modern days in its modified form.

Our forests are rich in edible material too e. g. Akhrot from *Juglans regia*, Chilgoza from *Pinus gerardiana*, Chironje from *Buchanania lanzan*. wild chickoo from *Diospyros melanoxylon* etc. All spices belong to various forest plants. Seeds of some plants are rich in essential oils. Other plants like *caryota urens* and phoenix species give readily utilizable alcoholic and intoxicating juice, when blazed. Fruits of *Carrisa*, *Capparis* and *Emblica*

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officinalis give good pickles and jams. Tea and coffee plants are only cultivated varieties of forest shrubs.

Forests flora also do not lack in natural cosmetics. In Northern India, ladies chew the bark of *Juglans regia* for colouring their lips red. Powdered leaves and seeds of *lawsonia alba* are used for giving "Mehndi colour" to hands and feet. *Sapindus* seeds are sold as soap-nut in the market.

One can certainly have a physically victorious fight with the enemy with the aid of *Mucuna pruriens* (Kimanch) pods obtainable from the forest.

Medicinal value of the forest is by no means a small contribution to the welfare of the people. "Triphala churan" remedy for stomach troubles contains powdered fruits of three forest plants viz. *Terminalia chebula* (Harra), *Terminalia bellerica* (Bahera) and *Phyllanthus emblica* (Amla).

Ephedrine, a relief for Asthama, is an extract from Himalayan herb *Ephedra gerardiana*. Banafsha a flue curer, is nothing but dried form of another Himalayan herb *viola serpens*. Cultivation of *Rauwolfia serpentina* these days in the forests has gained ground because of its utility against blood pressure, insanity and opacities of the cornea of eyes. Roots of *Saussurea lappa* hold importance as tonic in Asthma and chronic skin diseases. *Podophyllum* herb has recently been reported to possess powerful curative properties for various kinds of Cancer. Bark of *Cinchona calisaya* continues to be the source of present day quinine. Seeds of *strychnos potatorum* are used in the forest areas for magical purification of water. Camphor is extracted from *Cinnamomum camphora*. Nilgiri and citronellal oils are extracted from *Eucalyptus* species. Resin of *shorea robusta* is used for fumigation. This is much in brief about this aspect, playing a major role in the aggregate production of all round medicines.

3. Protective value :

We also owe an unfathomable extent of gratitude to the forests for the indirect advantages derived from them. They help in regulating flow of water in the streams by acting as underground sponge, invite rains and add modesty to climate and environment. Invasion of Rajasthan desert at a rate of about half a mile per year towards U. P. and Punjab, has been effectively arrested with vegetative wind breaks with species like *prosopis* and *Acacias*. Shifting of sand dunes, corrosive action of sea waves on the fore-shore lands have been frozen with *Casuarina* plantations.

Forests existed much before man and for that matter any other living organism. They provided the seat of vedic civilization in India. But with the alarming rate of increasing population, more land was pressed in for cultivation, thus altering the balance of land use in the Indo-gangetic valley. The results are obvious viz., repeated devastating floods. That is why it is believed that Forests precede civilizations and deserts follow them. Large scale soil conservation schemes based upon afforestation on war footing preparations have recently come into existence for protection against silting of huge dams like Bhakra, Hirakund, Panchet etc. For want of that, their stipulated life cycle was endangered. Nature takes about 1000 years for formation of 1" deep soil and hazards of erosion, through wind or water, displace or wash it off in no time in a disforested land.

The plants cause purification of the atmospheric air as they possess the power of utilizing the carbondioxide exhaled by human beings and animals and in return give out an almost equal volume of oxygen. But for that, chemists can tell better the horrible consequences.

4. Wild life :

The presence of wild fauna in the forests is a source of pastime for many. The Kanha sanctuary of M.P. for cheetal, deer and blue bull, the lion

sanctuary in the Gir forests in Saurashtra, the Periyar sanctuary of Kerala for bison and elephants, the Kaziranga sanctuary in Assam for Rhino, wild buffaloes and elephants, the Mundumalai sanctuary of Mysore for bears, spotted deer, elephants and bison, Corbet national park in U.P. deserve mention for their abundant and remarkable fauna.

In the words of Gautama Budha "Forest is a peculiar organism of unlimited kindness and benevolence that makes no demand for its sustenance and extends protection to all beings offering shade even to the axe man who destroys it." Well, then no wonder that the dacoits of Bhind-Morena run to the adjoining forests for refuge and also the saints and sages of Hardwar and Rishikesh seek help of the oceanic Himalayan vegetation in quest of eternal salvation.

This is much in a nut shell my introduction to our mighty forests—playing such a vital role, directly or indirectly in our every day life, but rarely impinging on our consciousness. That is the splendid and heroic part about it.

5. What is forest ?

With this back ground, now it is ripe stage to put forth what really forest is. The word forest is derived from the Latin root "foris" meaning out of doors and etymologically it is a large uncul-

tivated tract of land covered with trees and underwood.

In the Indian Forest records, forest is defined as an "Area set aside for the production of timber and other forest produce or maintained under woody vegetation for certain indirect benefits which it provides e.g. climatic or protective."

"Ecologically the term forest signifies a complex organism, composed of distinct biological units, called forest communities, that have come into being by the combined action, reaction and coaction of a variety of organism with the complex factors of the habitat that themselves change, both in space and time."

Thus forest vegetation evolves in accordance with positive biological laws and is not aggregation or accumulation of trees and other plants, brought together by chance. The notion that forest is an inexhaustable treasure of nature, held firmly in the public mind, is most unfortunate one. Well balanced methods of exploitation followed by equal amount of regenerating a forest, can alone ensure continuance of the forest resources for ever.

6. Analysis of plant kingdom

Now this multitude of services is performed by a plant kingdom. It can be systematically described as under :—

PLANT KINGDOM (Total No. of species — 3,43,225)

(1)		(2)	
Cryptogamos (No. 1,43,525)		Phanerogams (No. 1,99,700)	
Lower plants i. e.		Higher plants i. e.	
flowerless or seedless		flowering or seed bearing	
Have no value from cellu-		plants.	
losic point of view.		Comprise of utilisable	
		cellulose.	

Obviously from the pulp side, I have no chance to burden with further details about cryptogams, as their under associates like Thallophyta, Bryophyta and Pteridophyta lack the essential matter for pulping. So I will proceed with the description of their counterpart Phanerogams as under :

PHANEROGAMS

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Gymnosperms (No. of species 700) (naked seed) Conifers or soft woods generally long fibred.	Angiosperms (enclosed seed) No. of species 1,99,000 (
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Dicotyledons (No. 1,59,000) Broad leaved species or loosely Hardwoods generally short fibred.	Monocotyledons Species No. 40,000 Palms, bamboos & grasses.

From our point of view, study of timbers after classifying into two main groups the "soft woods" and "hardwoods" is purely a commercial approach and the trees that produce these two different classes of timber are quite distinct. Soft woods as already narrated are gymnosperms—conifers or cone bearing plants, distinguished by needle shaped leaves and naked seeds. The hard woods are dicotyledons-broad leaved plants, characterised by broad leaves and seeds enclosed in a seed case. Although the division into "Soft" and "Hard" woods is an easy one for drawing a dividing line between two broad classes of timber; there are a few timbers e.g. pitch pine among the softs woods that are actually harder than other timbers classified as hardwoods e.g. Balsa, Willows. Further this classification lacks justification in its application in tropical region where the native soft woods are usually called "soft hard woods" i.e. they are broad leaved species with soft woods. In fact soft woods in their true form do not occur in the tropical tract.

7. Features of Indian forests :

It will be interesting to trace out some facts about Indian forests. The Indian region lies roughly between 10°N—36°N latitude i.e. partly tropical and partly temperate. On the Northern boundary in the Himalayan terrain, commences the snow line at 16,000 ft. altitude. So the natural location of the territory with its peculiar topo graphical

features enables it to support complex, rich and variegated type of vegetation ranging from wet tropical to temperate Alpine zone type, comprising of about 30,000 species of higher plants including about 100 species of bamboos, 25 species of conifers. Orchidaceae is the largest family of flowering plants in India with nearly 1700 species. In order of abundance, we may count the seven dominant families in Indian flora as under :—

Orchidaceae, Leguminosae, Gramineae, Rubiaceae, Euphorbiaceae, Acanthageae and Compositae (richest family in the world).

Total forest area in India is 7,83,962 sq. km. (3,02,688 sq. miles) and constitutes only 24% of the total geographical area i.e. 32,63,354 sq. km. (12,59,982 sq. miles). On area basis the distribution of vegetation is very nearly as under :—

Temperate		Tropical	
Conifers	— 3%	Evergreen	— 12%
Broad leaves	— 4%	Deciduous	— 80%
		Others	— 1%
	<u>7%</u>		<u>93%</u>

Thus with this bulk of tropical forest, under the complete influence of Monsoon rain fall, the vegetation in India can rightly be called Tropical Monsoon type.

In the tropical forests most important timber species are only teak and sal with a total area of about 83,703 sq. km. (32,318 sq. miles) and 1,14,377 sq. km. (44,161 sq. miles). Roughly 50% of teak forest is confined to M.P. and 81% of sal forests are nearly evenly distributed in M.P. Bihar and Orissa.

The remaining area of 5,61,989 sq. km. (2,16,984 sq. miles) is covered with miscellaneous broad leaved species i.e. hard woods of evergreen, semievergreen, moist and deciduous type. Subject to technological complications in the process of pulping, most of the species in them can conveniently be pressed into use for pulping, as are not of much timber value.

8. Comparison of supply and demand :

From a total estimated growing stock of about 2298 million m³ in our country, aiming at exploitation of the increment only on the basis of sustained annual yield till perpetuity, keeping the existing capital intact, the estimated annual increment in productive forests in use is 1.5 million m³ of conifers confined to Himalayas and 28.9 million m³ of broad leaved species or a total of 30.4 million m³. The anticipated requirement of Industrial wood alone by 1975 is expected to be of the order of 16 million m³ including the requirement of pulp and paper industry which alone will consume over half of this. The gross increment indicated above has also to meet the requirements of fuel wood which in 1975 are indicated to be of the order of 150 million m³—of which 20% is met from state forests, which amounts to the total increment itself, apparently leaving no surplus to meet the requirements of the industrial wood. The seriousness of the situation in respect of raw material supply can thus be well appreciated.

Now returning to present forest resources in use viz bamboos, spread over about 14,000 sq. miles, as an under-storey mainly in miscellaneous and teak forests, it is anticipated that their maximum

stretch of annual production can touch a meagre figure of 2.4 million tonnes. To this can be added .1 million tons of Sabai grass (*Eulaliopsis binata*), thus bringing the total raw material probable supply to about 2.5 million tonnes.

But Poddar, Chairman of the Development Council (Pulp, Paper and allied industries) Govt. of India, places the future requirement of cellulosic raw material for the country as under :—

Year	Million tons	Against per capita consumption of
1970-71 IV Plan	4.2	3.5 Kg.
1975-76 V Plan	7.2	5.00 Kg.
1980-81 VI Plan	10.0	7.00 Kg.

Evidently if we have to meet adequately the country's increasing demands for paper and other allied matter, utilization of hardwoods will become inevitable owing to anticipated scarcity of industrial wood, particularly hitherto used raw material for pulping.

Even otherwise, the fate of bamboos in forestry both from the management, production and trend of future forestry point of views is not very bright. Therefore the writer would like to administer a mild timely caution to the management of paper industries not to be too crazy about bamboos and bear this fact in mind ere to causing installation of the machinery for future expansion programmes or new undertakings accordingly.

9. Trend of Future Forestry :

It will not be out of the way to add that with a view to meet the over all shortage of wood in times to come, forest departments in all the states will be absorbed in the afforestation of waste lands, opening out the productive, but hitherto inaccessible forest tracts and carefully planned afforestation schemes to replace inferior, poor yielding and mixed forests by valuable species of commercial importance or more productive fast growing species. In this process of replacement

much of the unsaleable wood, as the practice stands at present, is burnt on spot in huge piles for giving ash manure to the plantation site and keeping down future growth of weeds. In the opinion of the writer, it is a great source of leakage of constantly recurring loss of wood stocks in the name of preparing plantation sites. The Foresters instead would do well to resort to use of fertilizers, manures closer spacing for planting, and intensive soil working practices for aiding growth of plantations.

Is there a Forester with so undeveloped a mind
who still needs to be taught how to be kind
To the forests and forests of his own native land
(by author)

With the advanced growth of technical development for pulping, such permanent and compact sources of supply of raw material can be conveniently placed at the disposal of paper industries, who should come forward to utilise them as early as possible.

10. Description of Tropical forests :

Talking specifically of mixed deciduous vegetation constituting bulk of the tropical forests, the composition of the crop may be represented as under :—

(i) **Trees** :— *Cleistanthus*, *Terminalias* (*tomentosa*, *chebula*, *belerica*), *Anogeissus* spp, (*latifolia*, *acuminata*), *Diospyros*, *albizzias* (*lebbek*, *odoratissima*, *Procera*, *stipulata*), *Grewias* (*tilaefolia*, *asiatica*, *laevigata*), *Xylia* *dolabriformis*, *Pterocarpus* *marsupium*, *Ougenia* *dalbergioides*, *Cochlospermum* *gossypium*, *Kydia* *calycina*, *Lagerstroemia* *parviflora*, *Zizyphus* spp, *Soymida* *febrifuga*, *Aegle* *marmelos*, *Cassia* *fistula*, *Eugenia*, *Holoptelea*, *Anthocephalus* *cadamba*, *Erythrina* *suberosa*, *Erythrina* *indica*, *mangifera* *indica*, *Timarindus* *indica*, *Caryota* *urens*, *Shorea* *robusta* or *Tectona* *grandis*, *Hymenodictyon* *excelsum*, *Garuga* *pinnata*, *lannea* *grandis*, *Ailanthus*, *Adina* *cordifolia*, *Mitragyna* *poviflora*, *Schrebera* *swietenii*-*oides*, *Stereospermum*, *Chloroxylon* *swietenia*, *Semecarpus* *anacardium*,

Buchanania *lanzan*, *Pongamia* *glabra*, *Phyllanthus* *emblica*, *Oroxylum* *indicum*, *Gmelina* *arborea*, *Ficus* spp, *Dillenia*, *Careya* *arborea*, *Madhuca* *latifolia*, *Butea* *frondosa*, *Azadirachta* *indica*, *Acacia* *leucophloea*, *Schleichera* *trijuga*, *Alangium* *salvifolium*, *Bauhinias*, (*malabarica*, *racemosa*, *variegata*), *Dalbergias*, (*latifolia*, *Sissoo*, *paniculata*), *Bridelia* *retusa*, *Cordia* spp, *Boswellia* *serrata*, *Eriodendron*, *Phoenix* spp and some more too.

(ii) **Shrubs or small trees** :— *Casuarias* (*tomentosa* *glaveolens*), *Nyctanthus* *arborescens*, *Clerodendron*, *Holarrhena* *antidysenterica*, *Ixora* *parviflora*, *Woodfordia* *fruticosa*, *Randia* *uliginosa*, *Gardenias* (*latifolia*, *turgida*), *Jatropha* *curcas*, *lantanas* (*aculeata*, *Camara*, *indica*), *Mallotus* *philippinensis*, *Glycosmis* *Cochinchinensis*, *Embelia* *robusta*, *Limonia* *acidissima*, *Indigofera* spp, *Litsea* spp, *Murraya* *Exotica*, *Grewia* *hirsuta*, *Sterculia* spp, *Symplocos* spp, *Wendlandia* *exerta*, *Arundinella* *Setosa*, *Desmodium* spp, *Colebrookia* *oppositifolia*, *Thespesia* *lamban* and some more too.

(iii) Tropical evergreen or semievergreen forests are still richer in their floristic composition with predominating species like *Dipterocarpus*, *Macranga*, *Amoora*, *Polyalthia*, *Mallotus*, *Strychnos*, *Sterculias*, *Michelia*, *Artocarpus*, *Calophyllum*, *Cedrela*, *Terminalias*, *Ailanthus*, *Hopea*, *Salmalia*, *Albizzias*, *Mesua*, *Lagerstroemia*, *Cratoxylon* *Canarium*, *Vateria* etc. to quote only a fraction of them,

It may cause a sense of amazement when I say that out of the lengthy list of vegetal constituents, at present hardly 20% of them are commercially exploited by the Forest Departments for some or other purpose. The remaining bulk of it (barring areas close to habitation where they have got fuel value), just germinate, grow and ultimately die and decay. But peculiarity about all these tropical hard wood forests is that unlike coniferous forests, the various species occur in a heterogeneous form and exploitation of only a few of them for commercial purposes, will not only invite forest management complications,

but also will not be economical. So recourse will have to be taken to the use of mixed hard woods for pulping. Thus there is tremendous need of rapid research work for finding utility of the so far discarded and untapped species particularly in view of the latest school of thought emancipating that almost all woods (barring a very few) with suitable mixtures, can be used for pulping.

It is only a question of forming such permutations and combinations of about half a dozen of species, so as to render them economically exploitable on commercial scale.

11. Probable sources for investigation trials are :—

(i) Lops and tops of all timber species like teak (*Tectona grandis*), Sal (*Shorea robusta*), Asen (*Terminalia tomentosa*), Bija (*Pterocarpus marsupium*) etc. Occuring abundantly in compact blocks, individually and jointly, generally left in all the interior forests in appreciable quantities to the tune of over 2 million tonnes annually.

(ii) Unsaleable material annually of pole and sapling stage from thinnings and cultural operations of pure or mixed species both in respect of pure plantations and high or coppice forests. Exact quantity being indeterminate at this moment, but is expected to run in full figures of million tonnes. In case of established commercial utility of the saplings particularly of species like teak, sal, closer spacing for planting can be resorted to over come weed competition and also add to the remunerative intermediate yield of thinnings per acre.

(iii) Miscellaneous tree and shrub species of the mixed tropical forests viz., *Lagerstroemias*, *Kydia*, *Hymenodictyon*, *Albizias*, *Grewias*, *Bridelia*, *Cleistanthus*, *Erythrina*, *Terminalias*, *Bauhinias*, *Cochlospermum*, *Cassias*, *Schrebera*, *Dillenia*, *Careya*, *Anogeissus*, *Dalbergias*, *Ficus*, *Holarrhena*, *Stereospermum*, *Acacias*, *Chloroxylon*, *Lannea*, *Boswellia*, *Holoptelea*, *Soyimida*, *Garuga*, *Butea*,

Diospyros, *Macranga*, *Artocarpus*, *Amoora*, *Sterculias*, *Polyalthias*, *Trema*, *Strychnos*, *Cedrela*, *Mallotus*, *Wendlendia*, *Hopea*, *Ailanthus*, *Salmalia*, *Litseas*, *Casearias*, *Gardenias*, *Randias*, *Lantana*, *Nyctanthus*, *Ageratum*, *Glycosmis* etc.

As the group of floristic compositions will generally vary from locality to locality, initiative to suggest combination of species after careful and speedy survey on the part of forest officers in all the States, is highly imperative.

12. General :

It will not be out of the way to add that most of our working plans are a decade or two old, i.e., the age when the wood based industries were very few and even quite a number of them had not come into existence. Thus in the text of working plans, need for a particular type of raw material in a particular tract could not be anticipated. Question of evolving ways and means to meet that deficiency did not arise, as in the initial stages, the supply from the accumulated and old virgin stocks, remained a source of solace and satisfaction even to the industrialists. With the rapid scarcing away of the scanty raw material resources, immensely contributing day in and day out towards rising trend of cost of production, it is posing a serious concern to the industrialists for reasons more than one. Obviously time is now ripe when the forest department needs to put an end to its working in isolation unaware of woodbased industries requirements in its vicinity. Closely follows the corollary that there is immediate need for reorientation of the working plans for areas within economical reach of woodbased industries in order to cater their raw material needs at an economical rate in the larger interest of the nation.

In the formulation of national forest policy, paramount importance has been attached to the industrial aspect. To the Forester such an organised and concentrated management will naturally

mean an increase in per acre production potential of the forest and the industrialist will breathe a sigh of relief in curtailing the sphere of movement for collection of raw material. To be specific, a planted up area of about 2,000 acres with fast growing soft hard woods like Eucalyptus (exotic) or Ailanthus (indigenous) will meet the annual demands of raw material to the tune of about 50,000 tonnes where as for obtaining a similar quantity of bamboos from some of our existing forests, quite a few lac acres will have to be trodden. That conveniently speaks for high production and management simplicity of the former. In the name of efficient, more productive and economical management, the inferior and low producing vegetation must not be allowed to be sacrificed unused. At this stage the writer's sincere advice to the Country's talented technical personnel is :—

To plan use of existing resources of the land
That lie readily under the nose
With the tools that lie under the hand.
(by author)

With such a firm resolve and determination there can be no dearth of raw material for pulping.
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