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CONSERVATION THROUGH PRESERVATION

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ABSTRACT

Conservation of the depleted forest resources of the country should be looked at from several perspectives. Reafforestation and afforestation are primary requirements as is sustainable management in perpetuity. But what about the wasteful utilisation practices prevalent in the consumption of one million cubic metres of wood annually? What is the wastage factor? Can this be reduced to a rational level?

The need for a " National Utilisation Strategy " to stop wastage is timely. Some means of achieving this are discussed in this paper. Logging waste, in terms of tops and branchwood left on the forest floor, amounts to over 30% of the tree volume. Wastage due to inappropriate techniques in sawing is as much as 30%. The exclusion of sap-wood and the non-acceptance of lesser known species also contributes to wastage.

The redesigning of components for structural applications by grouping species by their physical properties, using improved techniques in joinery frames and trusses and using timber connectors, can not only save resources but also have cost benefits.

The service life of timber can be extended indefinitely if preservation treatment and kiln drying are practised. This prevents costly replacement and inconvenience to owners.

Reconstitution of logging waste and sawmill residues into particle board could easily replace the need for solid wood for a wide range of selected applications.

The total wastage factor of the volume of a whole tree can be expressed as 65% from the time it is felled to the time it is put into use.

INTRODUCTION

Timber is a renewable resource. True, but is 'renewable' really achieved in practice - especially in tropical countries where the more valuable hardwoods are found? Ninety five percent of tropical countries can be identified as developing countries, plagued with economic problems, population explosion and limitations on land. The few exceptions having surplus timber resources, are dependant on exports to sustain their economies. The present boom in timber export prices is destined to outrun supplies within the next two decades, as prophesied by world forestry authorities.

In Sri Lanka the situation is far from satisfactory with a Forest Cover of 24%. This includes highly protected areas like National Heritage Parks, Wet zone forests (having only 7% Forest Cover), climatic reserves etc. To meet the national demand, the area remaining as production Forests is extremely low.

The present lobby of Environmental agencies, professional institutions and non-governmental organisations has successfully identified the need for a "National Conservation Strategy". Some of the policies defined for such a strategy relate to Bio-diversity, Ecological balances and Management of life sustaining resources such as Land, Water and Forests. This effort is no doubt laudable, but what is suggested is to consider sustainability whilst providing adequate relief to the societies dependent on such resources.

DEMAND AND SUPPLY

The annual demand for timber is around one million cubic metres. The State Timber Corporation (STC) is the Sole Authority permitted to harvest in State Forests which provide less that 8% of the national demand. It is important to realise that 50% of the demand is met from home gardens and rubber and coconut plantations. About 40% of the demand is from imports both by the STC and the private sector averaging over Rs.100 million per year.

The main imports are comprised of species like Kempas (*Koompasia malaccensis*), Tualang (*Koompasia excelsa*), Keruing *(Dipterocarpus spp)* and Redwoods (mixture of red coloured woods of many species) from Malaysia through Singapore trade houses. These imports are mostly of the lower grades and are untreated, under-treated or just fumigated. With the relaxation of import duties there is bound to be very high imports in the future.

Unfortunately, such low grade timbers will find acceptance in an unsuspecting market, for mainly economic reasons. Poor consolation to ones integrity!

STANDARDS

What needs careful consideration, is the spending of an enormous amount of foreign exchange without adequate studies on the quality, durability and suitability of such imports. As a guide to both timber importers and users, adequate measures have to be taken to check timber properties, the preparation of national standards for treatment and timber grading. In this respect, the Institute of Construction Training and Development, and the Sri Lanka Standards Institute have done some pioneering work. But it is necessary to have a full-time working committee drawn from related Institutions to finalise this work within a given time frame.

LIMITATIONS

In the long term, the planners should focus attention on achieving self sufficiency through the Concept of "Sustainable Management Principles" giving due weight to better utilisation and waste management. Of course, the need for the establishment of annual blocks of land for reforestation to keep abreast with the increasing demand for industrial wood stands paramount in the equation.

This paper is, therefore, an attempt to highlight some vital areas needing the attention of those who are concerned, to prepare a "Utilisation Strategy" for timber and timber based products as a meaningful step towards "Conservation through Preservation". The areas needing attention include:-

The use of lesser known Species
Rational use of Timber
Utilisation of Waste

LESSER KNOWN SPECIES

In Sri Lanka the use of timber was bound to tradition and myths. In a by-gone era, the days of plenty, the prime quality timber species in high demand included Jak, Teak, Ebony, Milla, Satin, Nedun, Halmilla, Palu, Alubo, Mendora, Liyan, Dun, Domba, Tawenna and Ubberiya. Nobody was prepared to settle for less, for either construction or for furniture. These species have great strength properties, need little or no curing, could withstand natural hazards and have proven their excellence over the years. However, precautions like excluding sapwood (a zone vulnerable to decay and insect attack) over-designing of structures and ill conceived use of valuable species like Satin, Halmilla and Milla in the past, contributed to the speedy exhaustion of the supply of these species.

Of necessity, today's scarcity has created a search for replacement secondary species. What is now available in small quantities comes from plantation grown species like Teak, Mahogany, Eucalyptus and Pines and also from the lesser known species such as Kumbuk, Kolon, Paramara, Albizzia, Alstonia, Etamba, Durian, Mango, Rubber, Coconut, Ginisapu, Lunumidella, Dawu and Kataboda. Mango is a good example. Although it is not durable, it has better strength properties than Ginisapu, Rubber and Lunumidella. The potential for Mango, like Rubber, is therefore very high.

The criteria in judging timber are basically those of strength properties and durability. While agreeing that some species in the second group may not match the same strength properties of the preferred species, they cannot now be discounted on the grounds of poor durability, as this can be controlled scientifically.

Durability

Most timbers are prone to wood destroying agents such as rot, fungi, termites, beetles, borers and crustaceans. Whilst the heartwood of some species are resistant to attack, the Sapwood in almost all species is susceptible to degrade. Natural durability of wood can be classified into five classes.

1.	Perishable	-	less than 5 years
2.	Non-durable	-	5 to 10 years
3.	Moderately durable	-	10 to 15 years
4.	Durable	-	15 to 20 years
5.	Very durable	-	over 20 years

The Forest Department, in classifying timber for the building industry, has tabulated 120 species into two groups based on durability and treatability.

- SUPERIOR timbers are those where the heartwood does not need pressure treatment - 62 species.
- ORDINARY timbers are those that are moderately durable or non-durable where the heartwood needs treatment - 58 species.

Readers will be aware that the so-called superior timbers are no longer freely available. The list of preferred species mentioned above are all classified as superior timbers. But there is very little left and the only solution (Hobson's choice) is to use the secondary/ ordinary species, after adequate seasoning and preservative treatment to enhance their durability. The strength requirements will vary depending on the application and the user will need support in this area.

Treatment

Wood can be protected effectively against bio-degradation almost indefinitely, depending on the choice of techniques, chemicals and the methodology. Retention and penetration levels of the chemicals used are critical in the treatment process.
A classic example in present times is the use of rubber-wood after treatment in the furniture industry. It is earning valuable foreign exchange from exports of the finished product. What is more interesting, is the possibility of using pressure impregnated rubber wood for a more lasting purposes. Right at this moment, an enterprising young couple are building their dream house out of Copper Chrome Arsenic pressure impregnated rubber wood, for door and window frames and other components.

There are several techniques in treating timber vis-a-vis brushing, spraying, dipping, dip-diffusion and pressure impregnation. By far the best results are obtained by the vacuum/ pressure impregnation methods described as Bethels' process. This method is now available in the country at reasonable prices and the treatment carried out according to International Standards, with a guarantee on the treatment. The

treatment covers a wide spectrum of hazard classes ranging from Marine Piles to Housing components and furniture.

Seasoning

In its green form, timber sometimes has over 100% moisture content (MC). This is called free-water. After sawing it is not difficult to reduce this to Fibre Saturation Point (FSP), by air-drying in open stacks under shade to about 25% -28% MC. Any further reduction of moisture has to be carried out in drying kilns to bring down the MC to a state of Equilibrium Moisture Content (EMC). This will vary from 10% to 14% or even less depending on requirements, especially in the Furniture Industry.
Moisture in timber, unless reduced systematically, can cause movement, shrinkage, twisting, splitting, swelling and thereby lose its shape, grade and value.

Legislation

Both preservation and seasoning of timber should be well understood and even be enforced by legislation for the benefit of both customers and dealers - not only to save a valuable resource, but also to save the house-builder from costly servicing and replacement of timber components.

RATIONAL USE OF TIMBER

Designs

One has to only look up at the ancestral house roof or door and window frames to realise the over-use of timber. Unfortunately, these trends are still evident even in modern buildings. For example, a roof rafter is designed at 100mm x 50mm cross section, but if coconut is used 75mm x 50mm is popularly accepted, more because the high density zone of the coconut log limits the sawing of a 100mm dimension. In both these cases, the space between rafters are maintained at the same distance! Door and window frames can be designed to use 200mm x 50mm instead of the traditional 200mm x 75mm. The saving in reducing 25mm from one side cumulatively will be enormous.

Sap-wood

It is a requirement to exclude sapwood in most species and unfortunately even in the superior timbers like Jak and Mahogany sap is removed. But, although vulnerable to fungal and insect attack, sapwood has the same strength properties as heartwood . A simple remedy is to pressure treat this susceptible area resulting in a saving of at least 10% of the volume of timber. Malaysian Grading Rules specify that, if it is pressure treated, sapwood is not a defect in timber.

Timber Connectors

Included in the manufacture of frames, trusses and similar jointed components is morticing, tennoning, dowelling, drilling and routing. These practises cause unnecessary wastage - both in material, time and money. New techniques using timber connectors obviates this tedious and expensive procedure. Timber connectors are used to clamp two straight ends under pressure. In fact the connectors can hold joints at any conceivable angle.

As well as the benefit of saving a scarce resource, these techniques are also cost effective.

Pole Structures

The Timber Research and Development Association (TRADA) of UK in association with the STC has a programme to model low cost houses using raw material like small diameter logs and poles obtained as thinnings from forest plantations. All components such as trusses, frames, flooring and cladding will be fabricated from treated poles, a hitherto under-utilised forest product.

This project, inaugurated in 1993, is now on-line.

Grading

Like most other products timber, whether in log form or sawn, has to be priced not only based on species but also on the defects system and the cutting system. The principle is to obtain the right price for the right grade, offering a product range for different applications.

The Malaysian Grading rules identify some five basic grades namely Prime, Select, Standard, Sound and Serviceable. For convenience, these grades are grouped into four:

1. Select and Better
2. Standard and Better
3. Sound and Better
4. Merchantable

It is necessary that grading has to be developed into a set of "Sri Lankan Grading Rules" after adequate studies, trials and experimentation, with the participation of related institutions and the public. It is necessary that the timber traders and customers are aware of these facts before importing or locally processing timber for sale.

UTILISATION OF WASTE

Sri Lankan Situation

In the Sri Lankan situation there is an un-tapped potential laying waste on the forest floor and in processing yards. From the time of harvesting trees to primary processing into timber, the wastage factor has been estimated as 65% or the utilised

volume is only 35%. More graphically, when three trees are felled only one is utilized, or, expressed in hectares, for every 3 hectares of forest felled, two hectares are wasted. So much for conservation!

In developed countries, especially in the temperate regions, logging waste and sawmill residues (branchwood, lops, tops, off-cuts) and carpentry waste are channelled to manufacture the many variations of particle board and small components like fingerlings, parquet and glue-lam. Finally, even the sawdust is briquetted as a source of fuel and the bark is used as a base for fertiliser. Some of these wood based products adorn the pantries of Sri Lankan houses - an expensive dumping ground for this waste, whilst accumulation of residues cause pollution problems and even fire hazards. The principle followed should be to make use of waste or the bi-products of one industry, as the raw material of another.

Alternatives for Solid Wood

The uncontrolled use of solid wood is a heavy drain on a meagre resource. A decade and a half ago the Government decided to prohibit the use of species like Satin, Teak, Ebony, Halmilla, etc., in its solid form for furniture supplied to the establishment. This was to encourage the use of these species only as decorative veneers, after peeling or slicing, and not as solid wood. This measure has not had the desired effect.

It is relevant to recall that the Kosgama Plywood Complex was shut down over a decade ago, while the Gintota Plywood Factory is being resurrected under the private sector. To give a comparison, in neighbouring Bangladesh, having only 6.5% of the land area under tree cover, there are 20 Plywood mills, 4 Particle Board Factories and 1 Fibre Board Factory - all in production. Some of the notable diversifications in the use of non-solid wood are the new types of wood-based panels, which do not essentially change the technical features of the three basic products: Plywood; Particle Board; Fibre Board

CONCLUSION

Timber is still a cheap and popular building material conforming to a variety of requirements ranging from foundations to roofs. It is easily worked with tools and machines and has a very high strength-to-weight ratio. Added to its strength qualities, it is elastic enough to be bent and moulded into complex shapes by steam.

Timber has been taken for granted, and only a few have cared to study the merits and the benefits it bestows on mankind.

It fondles us in the cradle, shelters us throughout life and protects us even in death. Let us, in-turn, protect it indefinitely!