

“Forestry and its Development in Sri Lanka and Japan”

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Last year a project was initiated by the International Union of Forest Research Organization (IUFRO) on the subject “Utilization of Bamboo and, its related plants - mainly in Asia” in which I was involved. In the survey conducted, I realised that there was not sufficient data on this particular field as far as Sri Lanka was concerned. As such, I came to Sri Lanka to conduct research work on “Accumulation and Utilization of Bamboo in Sri Lanka” and spent three months on it.

I was somewhat surprised to hear that not a single University in this country had a Faculty for Forestry and Wood Science. The Forest Department which is responsible for doing development work in regard to forestry, I must confess, is way behind other countries. This is understandable due to reasons like lack of finance, personnel, etc. I, in my own way, have helped them during the past three months. And I am happy to state that the stage is now right to do something constructive. I was also happy to hear that the Department of Biological Sciences* in the University of Sri Jayewardenepura intends starting an M.Sc course in Forestry, and I think this is the correct time to start it.

I would like to divide my paper into three sections.

Firstly, with regard to my own experiences in this country during the past three months.

Secondly, forests and forest industry in this country, as I see it.

Thirdly, the present state of Forestry in Japan and the academic facilities provided by our Universities for its development.

Coming from the Far East, the first impression I got as I stepped into this country was the intensity of the sun. This is indeed a blessing to your country. Though it could be any foreigner’s first impression, I thought of it more deeply.

I feel there is great potential in using this valuable source of energy, rather than spending millions of rupees on other expensive sources of energy, like petroleum fuel. I am not in a position to say how much stronger the sun is when

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compared to countries like my own, but, it is important to launch on a big project to utilise solar energy more effectively. The greenery, which your country has been blessed with, is proof of this fact, and, of course, there is plenty of rain as well.

I was also able to see during the past three months, the social structure of this country. I think there is a vast difference here between the rich and the poor, which is normal in most developing countries. But what struck me most was that even beggars here had become part of human society. I know they are being looked after by others. On the contrary, in Japan, beggars are not looked after at all. We believe in the saying "Those who do not work are not entitled to live". The same situation prevailed in Japan upto about 50 years ago when the social situation was similar to that prevailing here.

In our country, 1908 saw the beginning of the Meiji era. In 1920 post-war restoration work commenced. The latter part of the 1950's saw the economic boom. These three stages of development took place stage by stage. But in your country, I feel the present state is a mixture of all these three stages happening all at the same time.

But the difference is that the Meiji era in Japan was inspired on its own, whereas this similar stage in Sri Lanka is influenced by foreign countries. As a result, people of Sri Lanka, even before they could stand on their own feet, seem to be working only to gain materialistic comforts. Utilising money for piling up of wealth in materials does not contribute to the development of the country's economy. Trying to develop cities like Colombo to become similar to places like New York and Tokyo and neglecting rural areas cause discrimination. This is a fact that will not be realised at the beginning. I can cite many examples from my own country to prove my point. Japan had to spend large sums of money to restore such damage and one factor for this was the egoism of the older generation living in these cities to support the political powers who help the advancement of building up cities, as it provides better living for them. Therefore, care should be taken to prevent such damage which would be detrimental to society. We also see over the past ten years in Sri Lanka that the value of money has dropped to half in comparison to the Japanese Yen. On the other hand we see materialistic gains have increased. This shows that this type of development has not helped to strengthen the country's economy. As a result, the standard of living which had gone up is only superficial.

Obtaining too much aid from developed countries makes Sri Lanka dependent on them which is not a very healthy state of affairs. Sri Lanka should be proud of its long history and rich heritage and it is your duty to work hard to be independent in order to prevent the downfall of your country

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I also see that your people have more human feelings in comparison with people from my country, which really is to be admired.

Japan, as you know was completely destroyed by war and we had to rebuild its structure. To achieve this, we blindly followed the American economic system. By this, industries developed and our people gained what could be achieved materialistically, which we thought was life. But now, our people realise that what is more important is human feelings, which we find difficult to recover. In Sri Lanka I see modern civilization being built on old traditions and when I realised this fact, I felt nostalgic by thinking of my own country way back before the war. Realisation of this fact made me feel so much at home here, although Sri Lanka is completely a strange country to me. In Sri Lanka, even the materialistic world has been assimilated into the rhythm of day to day life. By looking at the roads you realise this fact, Buses and bullock carts are run on the same highway along with automobiles. This is because the changes and the pace of change over the eras are well synchronized with the rhythm of people's lives. In my country, the speed was too fast and people became slaves to materialistic comforts. The highways there are paved only for automobiles and this has affected the unity of a neighbourhood. In Sri Lanka care should be taken, for the flow and tendency to becoming slaves to materialistic comforts is dangerously growing fast. I have seen such signs. So, it is important to maintain the traditional ways of thinking, in applying any project for development, whether it be forestry or any other project. Only then could we build a nation with a well balanced economy and a sound development strategy.

Forests and Forest Industry in Sri Lanka

I had the opportunity of seeing the following forests in the up-country, the dry zone and the wet zone of Sri Lanka; the Kurunegala Nursery Station and Mixed Plantation, The Kandy Udawattakelle Protected Sanctuary, Ohiya Natural Forests and Plantation, Habarana Natural Bamboo Forests and Nursery Station and the Sinharaja Wet Zone Rain Forest. By seeing these typical areas of forests made me recall my first impression more vividly, namely, the fact of the blessing and influence of the tropical sun.

Both, the natural and artificial forests, are of very high standards of growth and were very impressive. I was specially impressed by the Mixed Mahogany Plantation at Kurunegala. The reason is because, in Japan we do not have much of these hard wood forests. Here, I would like to compare forestry in your country with that in my country.

In 1979, Japan had planted 178,000 ha whilst Sri Lanka had planted 8,242 ha. Areawise, Japan is 5.6 times larger than Sri Lanka. Calculating Japan as being of the same size as Sri Lanka, Japan has 31,786 ha. equivalent of artificial forests. This shows that only 26% of artificial forest per year had been planted in Sri Lanka. With more intensive survey, taking the population

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into consideration, Sri Lanka is only one-tenth that of Japan. On the same calculation, in Sri Lanka, land per person becomes half that of Japan. The number of persons involved in forestry in Japan is 200,000. But in Sri Lanka those involved directly or indirectly are much more. That is to say, forestry in Sri Lanka stands at a low level at present. As it is, it is clear that there is so much potential in Sri Lanka, for development of forestry. Nevertheless, I appreciate the work carried out at the experimental plantations. Local species as well as exotics are being planted experimentally in different zones. The Eucalyptus Plantation at Ohiya with plants introduced from Australia is 60 years old and is quite a success. The pure plantation of Teak at Habarana is in danger due to pests. Mixed plantation at these sites is important to overcome this problem. The mixed plantation at Kurunegala which was laid down in 1931 has become almost a natural forest. In cultivating forests, Japan concentrates more on efficiency and believe in establishing pure plantations all over the country. Nevertheless, I feel Sri Lanka's method of mixed plantation is more practical and is in keeping with ecological balances.

According to the geographical situation of the island, Sri Lanka is blessed with many natural phenomena. Thus Sri Lanka has been able to cultivate artificial forests in accordance with its original natural vegetation. In other words, these man-made forests have been based on natural conditions. The Pinus and Eucalyptus Mixed Plantations from Welimada to Haputale are very good examples of this. Four kinds of eucalyptus and its hybrids are grown in Ohiya and are very interesting. The breast height diameter of trees at the Ohiya Eucalyptus Plantation was 60 centimetres or more. When I compare this measurement with that of my country's eucalyptus plantations, I could say that ours is a great failure. The reason is simply because these species grow fast and in Japan had been grown mostly for its pulp. They even planted them in unsuitable areas regardless of natural conditions. In this connection, I appreciate the efficient and practical approach of the forest officers who are in charge of these forests in Sri Lanka.

Though a small country, Sri Lanka's clear-cut zonal distribution makes forestry and its experiments quite interesting. As a result, re-forestation becomes easy and helps to accelerate activity. At Sinharaja, there is a new experimental plantation with *Pinus caribaca*, which is less than ten years old. A close study is necessary to see the changes and effects of its growth, in comparison with natural plants in this area. As far as I have seen, the field work carried out at all three zones are very effective and practical. But, due to lack of foresight fundamental research has not been satisfactorily carried out. The failure of most of the plantations arise due to this fact which is realised too late. I feel, therefore, that more importance be paid to research activities. Only then will a scientific forestry be created.

Cultivation of forests is similar to the upbringing of a human being. It is a very long process and needs a complex organization and a basic scientific

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attitude to bring out the best of its quality. If the scientific aspects are taught to the foresters it would help to maintain the balance between the theoretical and practical sides of forestry.

Natural forests in any country are the most valuable natural resources of a country. The following table gives a calculation of the value of natural forest resources in Japan.

FUNCTIONS OF NATURAL FORESTS	ESTIMATED VALUE	
	1972	1978
Water resources provided by natural forests	Rs. 161 billion	Rs. 299 billion
Prevention of Erosion	Rs. 227 billion	Rs. 443 billion
Prevention of drying of soil structure	Rs. 5 billion	Rs. 10 billion
Sanitation & recuperation provided for human beings	Rs. 225 billion	Rs. 367 billion
Protection of wild life	Rs. 177 billion	Rs. 197 billion
Supply of oxygen and its purification	Rs. 487 billion	Rs. 997 billion
TOTAL	<u>Rs. 1282 billion</u>	<u>Rs. 2313 billion</u>

These unseen values are not much regarded in developing countries because for them economic development comes first. They concentrate more on agricultural projects, building dams, etc. and on international aid and export earnings. As a result, these other resources get destroyed, and later it becomes a great problem to restore them. For example, as Japan was a very big buyer of timber, countries like Phillipines, Indonesia, Thailand, Burma and Malaysia exported timber to Japan on a very large scale. While earning large sums of money on these exports, these countries lost their valuable natural forest cover resource. They are now faced with the problem of re-forestation. Fortunately, Sri Lanka has not fallen into this trap. Thus, she still possesses these natural man-made forests, which could be developed further.

I would now like to compare the quantity of imports of timber by Japan with the annual production of timber in Sri Lanka. In 1978, the total annual imports from Asian countries alone was 22.4 million m³, whilst Sri Lanka's total production for that year was 75,930 m³. (Ref: Annual Report of the State Timber Corporation - 1980) This shows that the annual imports of Japan is 294 times Sri Lanka's total production. In others words, Japan imports annually 294 years production of Sri Lanka timber and this from Asia alone. Japan utilises 100 million m³ of timber per year, which is 1,317 times more than the timber used in Sri Lanka. On the basis of area, it is 229 times more.

You will also be surprised to learn that Japan uses 4% of the world's timber production.

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Forest area in Sri Lanka has reduced to 27%. I was made to understand that by the year 2000, there won't be any firewood in Sri Lanka. But, I personally feel that forest plains and open fields in Sri Lanka can provide resources for many more years to come. It is up to Sri Lankans to build up to its original state using the blessings of the sun. The dry zone which covers 65% of the total land area in Sri Lanka could be utilised very effectively for this purpose.

As I did not have the opportunity of obtaining information on forest products and wood industry in Sri Lanka, I am not in a position to say much about it. But, I happened to visit a few wood workshops turning out furniture and other household utility items. As I saw it, timber of very high quality had been worked on primitively. As a result precious timber had been wasted. It is important to do these more skillfully. Even the furniture I had observed did not have the proper finishing touch to them, especially the ones with carvings. Having a long tradition of wood carving, I expected work to be more skilfully carried out. It is important to maintain traditional skills and standards but it is also essential to turn out quality wooden products.

The present state of forestry in Japan

Traditionally, Japan's forestry was looked after by groups of communities who used to live in mountain villages and they were responsible for felling and re-cultivation. During the war, Japan's forests were felled mostly for turning out utility products and also a considerable proportion of the forests were destroyed. The majority of villagers involved in the forest industries were also recruited to the defence forces. These reasons affected the forest industries on a large scale.

After 1950, with the Government's new economic policies, attention was focussed on forest industry and these policies enabled large scale imports of timber. So, what was 70 million m³ in 1960, became 118 million m³ by 1973.

In 1973, there was a drop of timber imports to 100 million m³ but this was purely due to the fuel crisis.

94.5% of veneer and 58.1% of pulp in Japan is turned out of imported timber. The change of government policy with regard to import of timber, though it helped the economy, had its bad effects.

By concentrating only on convenience and efficiency in the day to day living conditions of the people, the entire socio-economic structure of Japanese society took a quick turn to consumerism and began to use the new forms of energy instead of depending upon the well tried out conventional sources of fuel energy. As a result, the production of firewood and charcoal which was 14 million m³ in 1966, dropped to 1 million m³ in 1973. This affected the production areas in mountains and villages. The sale of firewood and

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charcoal dropped and the villagers themselves got used to using other fuels. Accordingly, with this change of the rhythm of life, villagers started migrating to cities, where they found other means of livelihood. This resulted in the lack of skilled manpower for the maintenance of forests and the forests became neglected. Imports of timber therefore increased.

In 1960, Japan imported 13.3% of its requirement of timber, but in 1975, it shot up to 64.1. It has increased further since then, to 70%. This is because even "mountain owners" are unable to fell trees due to lack of manpower. On the contrary, it was more convenient to build up factories near harbours to turn out timber out of the logs imported. The revolution of utilising other sources of energy resulted in affecting the very existence of those who remained in the mountain forests.

Charcoal and firewood were not saleable anymore. So, they had to turn their hand to culturing the types of wood trees which could be used in construction and for the manufacture of utility products. Neglecting the basic concepts of ecology, they started planting more profitable species for this purpose such as Sugi and Hinoki. After the war, many of the natural forests were felled and used for the pulp and paper industry. When it came to re-afforestation, priority was given to these profitable varieties. As a result, all the hardwood forests were reduced in extent.

The result of this transition can be shown by the following figures :

Year	Softwood	Hardwood	Proportion of Softwood
			Against Hardwood
1953	360,271 ha	20,191 ha	18 times
1961	411,519 ha	8,516 ha	48 times
1977	197,686 ha	4,368 ha	45 times

When local production was insufficient, imports increased, but at a much higher price. Because of these high prices, people had to convert to other sources of materials, like concrete and aluminium. For example, the electricity pole, railway sleepers and scaffolds, which were traditionally turned out of timber, were now being turned out of concrete and aluminium. These high prices changed the style of peoples' lives to such an extent that instead of a traditional home with wooden furniture they became surrounded by substitutes for wood. Although statistically, a Japanese uses 132 times more timber than a Sri Lankan, this figure becomes ridiculous because the sense of using wood has completely changed, due to cheaper utility items being made out of a minimum quantity of wood.

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With forestry as a base many other industries are bound to spring up. Its various uses have caused development in several industries. With the stability of the economy, the demand for wood became less and this affected the sale of timber. As a result, the imported logs stagnated and it caused a depression of the economy.

As I mentioned earlier, the decrease of manpower in forestry resulted in the fact that only those over 40 years of age remained in this vocation. This number which was 63% in 1971 became 80% in 1979. This shows that there were less and less of younger people to carry on with this traditional industry.

In 1976, the area of forestry was 9.44 million ha, whilst the quantity of wood available was 2.2 billion m³. In 1996, the projected area for forestry is 12.39 million ha, whilst the quantity of wood available will be 3.3 billion m³. Estimates were done according to the existing policies, but the problem arises as to where to find the people to implement them and to reach the targets set by these projections. You will therefore see that the state of forestry in Japan is presently in an awkward position. On the other hand the wood industry in Japan has reached the peak of development with advanced technology and know-how.

I shall now confine myself to a discussion about forestry, wood science and wood technology as being taught in Universities in my country. I would like to specifically dwell on the constitutional structure that obtains for the teaching of forestry at Kyoto University, which is considered one of the best in the world.

Kyoto University has three sections on this subject. These are :-

1. Department of Forestry
2. Department of Wood Science & Technology
3. Wood Research Institute.

Nos. 1 and 2 conduct under-graduate and post-graduate courses, whereas No. 3 conducts only post-graduate courses.

1. The Department of Forestry consists of five laboratories :-

- a. Laboratory of Forest Management
- b. Laboratory of Forest Ecology
- c. Laboratory of Landscape Architecture
- d. Laboratory of Erosion Control
- e. Laboratory of Forestry Engineering

Each laboratory consists of one Professor, one Associate Professor and two instructors.

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The Department of Forestry accommodates 20 under-graduates and ten graduates each academic year. The under-graduate course is for four years while the M.Sc. is for two years and the Ph.D. for three years.

2. The Department of Wood Science & Technology consists of six laboratories:-

- a. Laboratory of Wood Technology
- b. Laboratory of Wood Structure
- c. Laboratory of Wood Working Machinery
- d. Laboratory of Chemistry of Forest Products
- e. Laboratory of Materials for Wood Improvement
- f. Laboratory of Chemical Processing of Wood.

This Department accommodates thirty-five under-graduates and eighteen graduates each academic year.

The two Departments mentioned above are attached to the Faculty of Agriculture.

3. The Wood Research Institute, being independent from the Faculty of Agriculture, has become an autonomous Institute of Kyoto University. This has five laboratories and one research section devoted to wood protection.

- a. Laboratory of Wood Physics
- b. Laboratory of Wood Chemistry
- c. Laboratory of Wood Biology
- d. Laboratory of Composite Wood
- e. Laboratory of Lignin Chemistry
- f. Section of Wood Protection Research

This Institute and its composition is quite similar to that of the Faculty of Agriculture.

I shall not describe the detailed structure of each, but, I would like to concentrate only on the Wood Protection Research Institute and try to explain its structure and functions.

There are 26 research workers, including Professors and Associate Professors. Office Staff comprise 13 persons. It provides facilities for five persons to study for the M.Sc. Degree and 11 persons for the Ph.D. Degree each academic year.

Out of the total budget of Rs. 3 Billion allocated to the Kyoto University, 39.3 Million Rupees is budgetted for this Institute. Salaries come to Rupees 18.6 Million and research expenses come to Rupees 20.7 Million.

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- a. The functions of the Wood Physics Laboratory are to study the:
- (i) Structure of the properties of wood
 - (ii) Relationship between humidity conditions and the nature of interior wall materials
 - (iii) Wood Formation and the development of quality of wood
 - (iv) Internal stresses of wood
- b. The functions of the Laboratory of Wood Chemistry are to study the :
- (i) Structure of the Polysaccharides present in wood
 - (ii) Chemical structure in relation to the lignin-carbohydrate complex in trees
 - (iii) Chemical modification of cellulose into functional polymer
 - (iv) Utilisation of lignosulphonate and carbohydrate in sulphite spent liquor
- c. The functions of the Laboratory of Wood Biology are to study the :
- (i) Ultra-structural and cytological studies of cell wall formation
 - (ii) Histological and physiological studies of the formation of wood and wood quality
 - (iii) Influence of forest management techniques on wood quality
 - (iv) Identification of excanated wood
 - (v) Wood collection and anatomical survey of wood
- d. The functions of the Laboratory of Composite Wood are to study the :
- (i) Development and improvement of wood-based materials
 - (ii) Study the behaviour of wood-based composite wall under fire conditions and fire retardance of wood-based materials
 - (iii) Service life of wooden structural members
 - (iv) Fracture mechanics of glue-jointed woods
 - (v) Visual characteristics of wood
 - (vi) Analysis of bending and buckling of wood-based structural panels and shells
 - (vii) Visual characteristics of wood
- e. The functions of the Laboratory of Lignin Chemistry are to study the :
- (i) Bio-Chemistry of lignification
 - (ii) Bio-degradation of lignin
 - (iii) Synthesis and reactivity of lignin
 - (iv) Polymerization mechanism of p-hydroxy cinnamyl alcohols
 - (v) Production of useful secondary metabolites by tissue culture
 - (vi) Chemical utilisation of tropical trees

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The functions of the Research Institute of Wood Protection are to study the :

- (i) Development and improvement of wood preservatives
- (ii) Physiology of active substances of termites
- (iii) Micro-biological deterioration of wood
- (iv) Mass culture and physiology of wood boring beetles
- (v) Marine borer attack on wood

Considering the plan layout of the 3 sections as a whole it definitely becomes the world's No. 1 University organisation for the study of forestry and you will observe a very detailed pattern of specialised professional distribution of work.

Although the University structure and organization looks solid, the practical application of the knowledge so obtained in the field has become difficult. This is because, on the one hand, the research workers in the various disciplines concentrate their energies only on their own work, while on the other hand, the University does not provide enough facilities for extension work. This prevents concerted action been taken by the foresters to tackle practical problems. Even if the University wants to be adventurous, there is always a control by the political system. As a result, the mutual interaction between the Faculty of Forestry and the Forest Industry is very little if at all!

I would like to add that I am greatly impressed by the idea of the starting of an M.Sc. course in Forestry in the Department of Biological Sciences at the University of Sri Jayewardenepura. To pioneer this project, I would like one of you to visit my country for a study of our system. But care should be taken not to blindly follow our method but be critical of the prevailing conditions there and select the best way for starting the course in this country. I can assure you of my whole-hearted co-operation and assistance in every way possible to achieve this. I would wish that very soon a Faculty of Forestry will evolve from this beginning.

Finally, I would like to make some suggestions which would help in development of Forestry and its allied industries in your country. In this connection, one factor that should be borne in mind is, that Sri Lanka has been very fortunate to have many endemic species of hard wood and that the potential for their re-cultivation are being provided by nature itself.

As you all are aware it takes about 300 to 500 years for some of these trees to grow to full size. Therefore, felling of these trees should be based on a well-planned scheme for re-cultivation and production. These varieties should only be utilized for turning out high-quality wood products and not for use as cheap timber.

In developed countries, mass scale construction, production and high cost of wood materials have caused a change in the style of construction of houses and other buildings. As a result, wood used in construction, interior decor, furniture and other utility items are being replaced with inorganic material, such as iron, steel, glass and artificial wood, etc.

Living in an atmosphere surrounded by these inorganic material, makes one's life quite uninteresting, boring and miserable, after a certain time. At this stage, the normal human tendency is to look for more solid organic material. Thus, wood such as Ebony, Teak, Mahogany, Rosewood and Satinwood become the most sought after. Therefore, when developed countries reach such a stage, then, in countries like yours these resources will automatically become valuable national treasures, even more valuable than gems.

To achieve this, protection of available resources and reforestation should be done under proper management, with highly developed technology and skills.

In Sigiriya, I happened to see an area covering about 500 acres of hard wood forest being burnt down for other cultivations. Destruction of forest resources of this nature should be considered a national crime.

Further, it is important to conduct immediately a survey on the yet unexploited types of effective hardwood.

The other important matter that should be concentrated on, is the intensive plantation during re-cultivation. As a good example, in my own country, an area of 2.5 acres of intensive plantation of trees such as Hinoki, fetches a value of 4 million rupees. Trees such as Mango and Jak which serve dual purpose as wood as well as food, could be grown intensively on a larger scale.

Instead of waiting till the Universities provide facilities to effect such changes, each Sri Lankan should individually contribute with the scientific knowledge he possesses, to this already established tradition and industry. Thus, one day, Sri Lanka will be well known in the world, not only for tea, rubber, coconut and gems, but also for a highly developed forestry and its attendant industries.

This is your motherland and you should always value it. It is important to build a splendid nation, whilst maintaining its culture, tradition and humanity.

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