TECHNICAL AND FINANCIAL EVALUATION OF GREEN EQUITIES

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Introduction

Forestry in India as a private venture is in its infancy and as a land-use is at its crossroads. After the advent of scientific forestry in the nineteenth century, there have been a number of occasions when this sector has made an attempt to change the pattern of Forest Management.

Briefly, it could be said that forest has moved from diffused (ownership-wise), unmanaged and unlimited resource-status to a fully owned (Govt. ownership), unitarily managed (Forest Dept.) and very scarce resource-status in the last century. In India, the constraints, such as unalterable (with no substitutes) dependence, vastness of the resource and poverty, have forced the forestry sector to change itself in a different direction in the last two decades than it was in the earlier decades of this century. All attempts of the Government to conserve this resource appear to have isolated the resource from the people as far as their responsibility towards maintenance and development of the resource is concerned while their dependency and inbuilt pressures on the resource have on the contrary increased due to population explosion and advancement in the use technology.

Productivity of India's Forests

India has a land area of 38.50 million ha under good forest cover. Although located in the tropics, the productivity of India's forests is amongst the lowest in the world. The current productivity is only 0.7 m^3/ha/yr. At the present levels of consumption of forest resources, the country needs a minimum of 0.47 ha of forest land for every individual against the actual availability of 0.11 ha. The figure of productivity on the basis of recorded productions is only 0.5 m^3/ha/yr (Lal, 1986).

The actual productivity assessed by the Forest Survey of India in well managed and reasonably protected forests in different regions of the country is as given in Table 1.

Table 1

Productivity of forests

Region	Productivity (m^3/ha/yr)
Western Himalayas	2.21
Eastern Himalayas	2.03
North East	1.66
Western Coast and Andaman & Nicobar Islands.	3.85
Deccan	1.35
Central India	1.05
Gangetic	0.86
Dry forests of Indus plain	0.41

These figures do not indicate average productivity but that of those forests which are more or less free from adverse biotic interference. That is, these represent

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potential productivity for most of the forests of the country. The field assessment gives the figures of average potential productivity only at about 1.5 m^3/ha/yr.

Under the above described conditions, it could be seen that the pattern of change in the forest management in the last decade has been from "single department" affair to a state of multidimensional activity involving people at various decision making levels. The present day forester talks of involving people, in and around forests, in the protection and management of forests. Another such development is the development of the corporate sector in the forestry development. Although this is mostly to cater to the needs of the industries, it would also add to the quantum of forest products available to the people at large. There have been some attempts to raise captive plantations to augment raw materials for industries.

There are three variations in the corporate sector forestry, they are :

(i) Captive plantations on the land owned by the company with own investment (WIMCO Ltd).

(ii) Captive plantations on farmers fields with own as well as borrowed funds. (WIMCO Ltd).

(iii) Plantations on own land with funds raised from the market by way of shares/ equities/debentures etc.

The third aspect is the purview of this paper.

Review of Literature

As already stated, forestry as a private venture is in its infancy. That is why there is paucity of precise literature on this aspect of forestry. The process of tree planting, rearing and harvesting is yet to be considered a serious enterprise and is not adequately supported by economic analysis of costs, constraints, returns and identification of public policy options (Joseph, 1992). In spite of the thrust accorded to growing trees both on government and private lands in the last decade this sector has yet to show its penetration into the economy to the extent that it caters to the various needs of the people. Due to lack of such development, both in government as well as private ventures, the greening of the country as a "motto" has not yet picked up. Although, most of the states have implemented various patterns of social forestry projects, the anticipated impact has not been noticed. Still such stray examples like WIMCO etc. help to indicate the possibility and keep the interest in this field alive. But the kind of offers/schemes that are being floated with an assurance of high returns on small investments make detailed study of such offers necessary.

There are various permutations and combinations of these offers with land and trees, different extent of land on which trees are grown and number of trees grown linked with gold bonds, Indira Vikas Patras, holding recreation facilities in plantation sites, discontinuance and compensation, personal accident insurance coverage (not for trees) and incentives. The assurances of the agencies are that they will raise trees by scientific methods employing experienced professionals, the trees will be insured and one can always take back the money or transfer the membership to any other person (Joseph, 1992).

It is true that the spiraling prices of

teak and the present day attractive returns have caught the imagination of investors, they are ignorant about the fact that the assumptions and estimations of these companies need a technical back up. Mr. Joseph further says, the industry, whether in the corporate or cooperative sector must be encouraged to take farmers as partners in such enterprises, but the predictions and commitments made should be nearer to achievable figures.

According to forest officials, a couple of such attempts done in South India were unsuccessful. They claim that a teak tree, which takes about 70 to 100 years to mature cannot give a return of Rs. 1,00,000 in 20 years. They cannot get Rs. 100,000 for a teak tree after 20 years because it will still be a pole not a full grown tree (Prasad, 1993). The project of growing teak trees under controlled conditions has never been tried anywhere in the country as a commercial venture. The quality of timber expected from teak trees grown under high intensity management would not be as good as the trees growing in a natural habitat (Prasad, 1993). While the companies claim that it is possible to expedite the growth of teak with proper care, fertilizer and irrigation, the forest officials' technical argument is that, the rings in the trunk will be shorter and the grains will not be as good as a mature tree. The quality will be poor and a large portion of the trunk will have the sapwood (not useful as timber).

Some data for the Teak plantation efforts are available from Kerala State. Only the details regarding the post plantation establishment operations are being considered for analysing the yield potential of teak under different site quality conditions.

(a) *Post establishment operations in teak plantations* : The post establishment operations commence in the 4th year (some places it is the 6th year) when the first thinning is carried out and thinning is repeated in the 8th, 13th, 20th and 44th years. The first two are systematic (or mechanical) and reduce the crop from 2500/ha at the time of planting to 1250/ha at the first thinning and to 625/ha at the second. All subsequent thinnings are selective and are aimed at producing an even distribution of the crop. Thinnings are carried out with reference to the All India Yield Tables and the general 'rule of thumb' is that the spacing should be about 1/3 of the average height. Table 2 gives details of the thinning yields obtained from plantation in the Konni Forest Division, Kerala.

Table 2

Thinning yields obtained from teak plantation in the Konni Forest Division (Kerala).

Age (years)	Yield (m^3/ha)		
	Poles	Timber	Total Vol.
4	0.439	-	0.439
8	2.646	-	2.646
13	4.381	0.005	4.386
20	6.865	0.180	7.045
30	7.328	1.591	8.919
44	7.808	4.610	12.418
Total	29.467	6.386	35.853

(b) *Final fellings and yields in teak plantations* : In the Konni Forest Division, the rotation adopted is 70 years and is aimed at obtaining of trees of over 180 cm girth although it is only in Site Quality Class-I that the maximum number of trees of this size is obtained. Table 3 gives the details.

Table 3

Crop diameter (cm) and percentage of trees above the exploitable diameter of 57.3 cm (180 cm girth).

Age (Yrs.)	Site Quality			
	I	II	III	1V
50	55.4	39.9	26.4	17.0
	(36)	(2)	(0)	(0)
60	60.7	45.0	30.0	19.0
	(59)	(4)	(0)	(0)
70	65.3	49.3	33.3	20.8
	(80)	(8)	(0)	(0)
80	69.0	53.5	36.8	22.9
	(88)	(25)	(0)	(0)

Figures in parentheses represent the % of stems above exploitable diameter.

Based on total volume, the age of maximum volume production varies from 5 to 15 years depending upon the site quality. Taking stem wood volume alone, the mean annual increment culminates at age 50 years on Class-I sites and age 75 years on Class-II sites. The average yield from final fellings in Konni plantations was 88.86 m^3/ha of timber and 47.79 m^3/ha of billets. The total yield obtained from thinnings and final fellings averaged to 172.32 m^3/ha on a rotation of 70 years which gives a mean annual volume of 2.46 m^3/ha.

Green Gold Gimmicks

A new phenomenon to promote various timber species (especially teak) with small investments from general public in the form of contributions towards one or more trees to be planted in a chunk of land owned by the sponsorers has recently emerged in India.

Teak (*Tectona grandis*) is the main species in these proposals. Its value and suitability for a wide range of uses, because of its freedom from serious problems related to disease of pests and because, establishment and maintenance techniques are simple and investment requirement relatively low. Teak is a very good coppicer and is a very hardy species suitable to be planted on a variety of soils.

While rosewood, banana, mango, silver oak, coconut also form part of these proposals they invariably call teak as green gold.

Location of Land : In all the proposals the land is located near big cities like Madras, Bangalore, Bhopal, Dehra Dun etc. This is probably with an eye on the future market and also presently these places being suitable to the companies.

Allocation of land / tree : The allocation of land per tree (final stage) varies from 9.29 m^2 to 10.68 m^2.

Investment pattern : Most of the proposals have a pattern of one time investment per tree. The per tree investment varies from Rs. 495 to Rs. 2,500.

A Company has a variety of offers in which the investment per tree is of Rs.1,275. One can invest on 2, 5, 8, 11, 16 and 21 trees. They also have an assurance of allotment of about 10.70 m^2 land per tree, in the name of investor. Some of these offers provide for payments in instalments also.

Gestation period : The gestation period varies from 11 years to 20 years for teak and other species.

Growth rate and return : The growth rate estimated varies from 0.050 m^3/tree/yr to 0.056 m^3/tree/yr. At the end of the project period of 20 years, each teak tree is expected to give 1.13 m^3 of sawn timber. These

schemes assume a return of Rs. 90,000 per m^3 after twenty years. A Company has also come out with a "Retirement Teakquity" scheme in which an investor can opt for a monthly return of Rs. 620/- per tree after twenty years.

Technical and Financial Analysis

As there are no growth data available for teak grown under controlled conditions as a commercial venture, we may have to resort to comparing the estimations and assumptions made in these green equities with the available data on teak plantations raised by the forest departments on forest lands.

Similarly the financial analysis would rest on the price changes in teak-timber prices in the sales organised by the Forest Departments through their sale-depots. On this aspect also the price data are not easily available.

Technical Analysis : In the Konni Forest Division, Kerala, the annual volume yield attained on a rotation of 70 years was 2.46 m^3/ha. If we assume that after all the thinnings were completed, there would be on as average 300 trees/ha, then the mean annual volume attained per tree works out to 0.0082 m^3. In these schemes, the mean annual increment per tree assumed is about 0.054 m^3 which is approximately 7 times the actual attained, that too in 20 years period (approximately one-fourth). Another critical factor is that the yield assumed is in terms of sawn timber, while the yield obtained in Konni Division is in round volume. Even if we assume a conversion factor of 0.70 from round to sawn timber the assumed annual increment per tree rises to 0.077 m^3 approximately 10 times the actual attained. This quantum of yield at the age of 20 years appears technically infeasible.

Financial Analysis : The available domestic teak prices (Table 4 indicates that in Andhra Pradesh the price/m^3 increased from Rs.459 in 1967 to Rs. 920 in 1976 i.e. double in 10 years. In Gujarat State price per m^3 has increased from Rs. 1208 in 1979 to Rs. 3300/ m^3 in 1982 i.e. a 2.7 times increase in four years. The present prevailing average price in the country is around Rs. 12,000/m^3 for round timber. Thus the price assumption of Rs. 56,000 to Rs. 87,500/m^3 for sawn timber after 15-20 years of the project period appears to be on the higher side, especially when the trade monopoly of the Forest Department is going to be broken. The prices

Table 4

Forest Products Prices- Domestic Teak Prices.

Size of the Timber		Years									
		1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
90 to 120 cm girth	Rs./m^3	459	455	416	455	490	530	525	770	875	920
Andhra Pradesh	US $/$m^3$	61.23	59.95	55.34	60.67	65.66	69.79	67.81	45.04	100.02	102.7
					1979		1980		1981		1982
60-90 cm girth	Rs./m^3				1208		1380		2095		3300
Gujarat	US $/ m^3				148.7		175.5		241.9		349
120- 150 cm girth	Rs./,^{3}				1635		1965		2360		4100
Gujarat	US $/$m^3$				201.2		250.3		272.5		433.40

may not escalate to that extent as the quantity of timber available in the market is likely to increase because of such schemes.

Conclusions

The proposals/offers of the different green equities are heavily lopsided with little technical and financial feasibility. Apart from above factors, these schemes also have following subjective inconsistencies :

1. The tree certificates issued to the investors are transferable and can be bought and sold. But the fact that these certificates will not be quoted in the stock market and the gestation period is long would make it difficult for the investors to find buyers.

2. The quality of timber extracted from teak trees grown under high intensity management would not be as good as the trees growing in a natural habitat.

3. At the age of 15-20 years a large portion of the trunk of the tree will have the sapwood.

4. In case of natural calamities like fire, floods, drought and insect attack, there is no guarantee against the loss.

5. The assumption that income from these schemes would be a tax free income even after 20 years period may not be correct under the present changing financial and economic scenario in the country.

6. Substitutes to teak wood may be developed in a period of 20 years.

Epilogue

Although Green equity schemes are of immense importance in terms of involvement of private people in the forestry sector, it would be proper to remodel them according to technical and financial feasibilities. Apart from the Forest Policy objective of greening 1/3rd of the country's land mass the ever widening gap between demand and supply of timber, fuelwood, pulpwood and other tree based raw materials force the government to encourage adoption of imaginative policies and bold initiatives to involve all possible agencies and individuals in a massive tree planting effort based on contemporary scientific knowledge and sound management practices. The government must encourage such investments by offerng incentives in the form of subsidised lending, disaster insurance, tax exemptions etc. This would help not only to fulfil the forest policy mandates but also provides enough stimulus to transform the rural landscape of India.

SUMMARY

Forestry in India as a private venture is in its infancy and as a land use at its crossroads. The scientific forest management in this country is approximately 100 years old and during this period, it has seen and experienced various jolts. Forest - as a resource of environmental and economic importance - has moved from diffused (ownership wise), unmanaged and unlimited resource-status to a fully owned (Government ownership), unitarily managed (Forest Department) and very scare resource-status. Present day upsurge in environmental awareness and the role of forests in environmental conservation has enhanced the importance of this sector to such an extent that people from various walks of life give innovative ideas of management for this resource. This paper concentrates on the upcoming corporate sector in plantation forestry by way of either company investment or investment from public. An analysis of such proposals presently being floated by various companies has been done in terms of technical feasibility and financial viability vis-a-vis the experience of the Forest Department in raising Teak (*Tectona grandis*) plantations. While this paper assesses the proposals to be based on unattainable assumptions, it also suggests the governments to encourage such attempts by giving subsidies/incentives.

हरे साम्यों का प्राविधिक और वित्तीय मूल्यांकन

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सारांश

भारतवर्ष में निजी उद्यम के रूप में वानिकी अपने शैशवकाल में तथा भूमि उपयोग के रूप में चौराहे पर खड़ी है । वनों का इस देश में वैज्ञानिक प्रबन्ध अब लगभग एक शताब्दी का हो चला है और इस अवधि के दौरान इसने बहुत कुछ देखा और सहा-झेला है । पर्यावरण में और आर्थिक महत्व के रूप में वन प्रसृत (स्वामित्व के विचार से), अप्रबंधित और असीमित स्रोतों वाली स्थिति से चलकर पूरे स्वामित्व वाले (सहकारी स्वामित्व) एक जगह से प्रबंधित (वन विभाग द्वारा) और बहुत कम स्रोत वाली स्थिति तक आ गए हैं । पर्यावरण जागरूकता के वर्तमान उछाल और पर्यावरण संरक्षण में वनों की भूमिका ने इस क्षेत्र का महत्व इतना अधिक बढ़ा दिया है कि जीवन के विभिन्न क्षेत्रों में कार्य करने वाले लोगों ने इस स्रोत का प्रबन्ध करने के बारे में नये-नये विचार प्रस्तुत किये हैं । इस अभिपत्र में रोपवन वानिकी में कम्पनियों द्वारा धन लगाने अथवा सार्वजनिक धन लगाया जाने के परिणाम स्वरूप उभर कर आ रहे सामुदायिक क्षेत्र पर ध्यान केन्द्रित किया गया है । अभिपत्र में विभिन्न कम्पनियों द्वारा शुरू कराए जा रहे इस तरह के प्रस्तावों का विश्लेषण उनकी प्राविधिक शक्यता तथा सागौन (*टैक्टोना ग्रांडिस*) के रोपवन तैयार कराने में वन विभाग को प्राप्त हुए अनुभवों की दृष्टि से उनकी वित्तीय संभाव्यता की दृष्टि से किया गया है । यह अभिपत्र इन प्रस्तावों को यद्यपि प्राप्त न हो सकने वाली अभिधारणाओं पर आधारित किया हुआ अनुमानता है, फिर भी इसका सुझाव है कि सहायता एवं प्रोत्साहन देकर सरकार को ऐसे प्रयत्नों को बढ़ावा देना चाहिए ।

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