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The expected life of such projects will vary widely, depending on the physical conditions present, but the 50-year period used in the U.S.A. has proved to be too short for those conditions. The feasibility study of a particular watershed must not only establish the unquestionable need but the optimum size of development in order to be efficient in addition to the least cost of construction.

While the benefit-cost type of analysis is open to several criticisms, it does permit an orderly approach towards guiding land use development. It brings to bear on the problem many disciplines—agronomy, forestry, engineering, economics, etc., in designing a multiple use project which over time can prove to be a valuable asset to the region and the country.

SOME ASPECTS OF FORESTRY DEVELOPMENT AND POLICY IN INDIA

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Ever since its origin, mankind has been constantly making an endeavour to solve its economic problems through the transformation of the natural resources at its disposal into usable goods. The problem, however, arises when such natural resources are indiscriminately used by man because of divergent economic interests of an individual from those of society. This calls for a policy to regulate their use. Exploitation of the forests is a part of this general problem. There was no clear cut policy in India as late as 1864 to guide the use and development of its forest wealth and consequently the forests in this country were subjected to a good deal of indiscriminate and uneconomic use. There are, however, some instances available prior to 1864 which, at times, are mistaken for a forest policy. We know, for example, that some kings in ancient India had executed plans for planting trees on both sides of the public highways or a medieval ruler had ordered for such plantations on both sides of a canal. Similar efforts were made by the British Government around 1800. The Forest Committee of 1805 for Madras is one such example. On the recommendations of this Committee the royalty rights over "teak" trees in the South were proclaimed and the need for construction of more forest roads was realized to tap the distant areas. Such actions do not speak of any appreciation of the true value of the forests and cannot be given the status of any scientific effort aimed at strengthening the forest resources.

The establishment in 1864 of a separate Forest Department under the Government of India and the efforts that followed are considered as the first serious attempt to check the early practice of exploiting the forest merely for obtaining supplies

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of timber and to "treating them as a biological growing entity of much value and handling them in accordance with principles of scientific forestry."¹ The forest policy of 1894 (Circular No. 22-F dated 19th October, 1894 of the Department of Revenue and Agriculture) marks the next important stage in the forestry development in India. The policy recognized very clearly the important role that forests could play in the development of agriculture and laid down the principles which should govern the management of State forests in British India. Any detailed discussion on the merits or the working of that policy may not be within the purview of this paper.

Forests in India, however, continued to be under strain because of a continuously rising population, the two world wars and the changing political situation in the country. Population pressures on land have always had an adverse effect on forestry because of the competitive nature of the crops under which acreage had to be expanded. The problem was further accentuated by the export of enormous quantities of timber during the world wars. This resulted in excessive felling and advance working of the forests. Then, the administrative changes brought in their wake a shifting of loyalties towards forests. In 1921, the forests were declared a transferred subject and their administration was vested with the Provincial Governments. In 1935, with the Government of India Act, the forests became entirely the concern of the Provinces.

The result of all this was the emergence of wide discrepancies in the handling of forest affairs by different interests, and as such, gaps in the forestry development in different parts of the country widened. Except for a few states like Travancore, Mysore, Hyderabad and Jammu and Kashmir, most of the other Princely States looked at forests mainly as a source of revenue and hardly any measure of forest conservancy was practised. Thus, at the time of Independence there existed considerable variations in forest laws, forest organizations and forest working in the different units now forming the States of India. The problem of consolidation of forests, unification of forest laws, as well as of extension of scientific management on a reasonably uniform basis were, therefore, major tasks before the nation to be completed on priority basis. It is in the context of this background that the National Forest Policy (NFP) of 1952 (Resolution No. 13-1/52-F dated 12th May, 1952 of the Ministry of Food and Agriculture) is to be understood and judged.

The NFP visualized the present and future needs of the country in the context of forests and on the basis of the experience gained from the Indian Forest Act of 1878 and the Forest Policy of 1894, the forests were given a functional classification, *i.e.*, protection forests, national forests, village forests and tree lands.

Growth of Forest Resources

A major objective of the new policy was to bring one-third of the total geographical area of the country under forests as against 22.5 per cent in 1951-52. It was further stated that about 60 per cent of the area in the hills where forests have their protective functions and 20 per cent of the area in the plains must be

1. 100 Years of Indian Forestry 1861-1961, Vol. I, Forest Research Institute, Dehra Dun, Manager of Publications, Government of India, 1961, p. 77.

covered by forests. Importance of an even distribution of forests in all physical regions of the country was also realized and afforestation of marginal lands and village waste lands, etc., was recommended (section 19).

The progress in the direction of realizing this aim is, however, by no means satisfying. A close look at the rate of growth of the area under forests for the period 1951 through 1962 reveals a significant decline, the rate being -0.6163 per cent. This is statistically significant at 1 per cent level of probability (Appendix I).

This is an undesirable trend and our NFP as well as its follow-up are responsible. To take a few examples, while the desirability of a detailed survey of all lands as a basis for evolving a system of balanced and complementary land use, under which each type of land is allocated to the use where it would produce most and deteriorate least (section 3 and 9) was emphasized in the NFP, such a survey has not been undertaken so far. A very important plank of the policy has thus been left unattended to. Similarly, to save the resources from destruction, emphasis was placed on weaning the forest tribes away from their age old practice of shifting cultivation—long fallow (section 23). This was sought to be achieved voluntarily. Is this practicable by the time these tribes do not appreciate the intangible value of the forests and possess a high sense of responsibility? What is needed is providing them with alternative avenues of livelihood.

In fact we have gone too far in our hope in the voluntary efforts for proper maintenance and for increasing our forest resources. One such case is the importance attached to “making the whole nation tree conscious” so that unscrupulous cutting of valuable trees is eliminated and individuals are induced towards planting more trees (section 15). Was it not too much for a nation to have exalted faith in the individual effort for a social cause particularly when old values of life have lapsed and new ones are yet to be evolved?

The *Vana Mahotsava* (festival of forest lovers) and *Van Premi Sangh* (Association of forest lovers) were supposed to play vital role in this voluntary effort. Contrary to this, most of the trees planted during the *Vana Mahotsava* week are left to die to yield place for new plantation next year. Another yearly festival has thus been added to the land of festivals. The *Van Premi Sangh* remains unheard. Similarly section 17 of the NFP recognizes the need and importance of growing a few trees per acre of cultivated area by individual cultivators. Though no data are available about the progress of work in this direction, yet a visit to the countryside where the consolidation of holdings has been completed or is in progress can convince the visitor that the number of such trees has been reduced rather than increased. The village forests too have met with the same fate. During the Third Five-Year Plan period 0.60 lakh acres of land were brought under village forestry against a target of 12 lakh acres.² This is because of our pinning of hopes on efforts by institutions like village panchayats which do not command much resources and lack enthusiasm to do the job. This dependence on voluntary effort seems to have come because of a belief, on the part of the policy makers, that in a democracy things should be done through an understanding of their advantages

2. Fourth Five-Year Plan—A Draft Outline, Planning Commission, Government of India, 1966, p. 205.

by the people and the society should learn to help itself. Democracy may be a necessary condition but it is not a sufficient condition for generating a sense of responsibility in a society.

Similarly, when we look at the progress of forestry in the States which were below the country's average in respect of area under forests in 1956-57³ we do not find satisfactory results. Table I shows that the area under forests in many of these deficit States has gone down and the decline is alarming in the case of West Bengal and Jammu and Kashmir. This calls for some drastic action. Here we have attempted to work out the potential for increasing the area under forests in these deficit States (columns 4 and 5). By adding column 5 to 3, one can see that except for the States of Punjab (now Punjab and Haryana) and Jammu and Kashmir, all other States have reasonably good chance of realizing the average of 20 per cent of their area under forests.

TABLE I

States	Geographical area (sq. miles)	Per cent area under forests*		Potential new area that can be brought under forest cultivation	
		1956-57	1961-62	Actual (sq. miles)	Percentage
	1	2	3	4	5
Bihar	67,198	19.3	18.0	3,745	5.57
Maharashtra†	1,91,038	17.1	16.9	6,967	3.65
Madras	50,132	16.4	16.6	5,069	10.11
Punjab	47,084	11.4	12.7	2,167	4.60
Uttar Pradesh	1,13,452	13.5	15.7	9,586	8.44
West Bengal	33,928	17.5	13.4	2,472	7.29
Rajasthan	1,32,150	12.9	11.5	31,931	24.16
Jammu and Kashmir	86,024	12.9	9.5	1,500	1.74
Mysore	74,122	18.7	19.2	10,420	14.05

† The percentage of area under forest in 1956-57 for Maharashtra State includes Maharashtra and Gujarat and the figure for 1961-62 is the weighted average of percentages of both these States.

* This includes barren and unculturable land and culturable waste lands in 1962-63.

3. This year has been selected purposively as the States were reorganized in 1956-57. The boundaries over years are now comparable.

These calculations of potential areas have certain limitations because the details regarding the suitability of these areas for forest cultivation are not available. We, therefore, emphasize the need for a detailed statewise survey of all waste lands so that a balanced land use pattern can be evolved.

Further, it is suggested that the work be done towards finding out the most economical species of trees for different areas depending upon their climatic, topographical and soil conditions. This can be done by the State forest departments in co-operation with the Agricultural Universities/Institutions in their region.

Growth of Forest Produce

Growth rates of the outturn of the major and minor forest products, industrial and fuel wood per square mile of forest area and per thousand of population show interesting results which are presented in Table II. The rate at which the industrial wood has been exploited over this period has grown significantly both in physical as well as in value terms. The rate of growth of the outturn of fuel wood is positive but not significant. This can be attributed to the population pressure which created more demand for fuel wood and brought about a disproportionate rise in its price. The fact that the growth of outturn of fuel wood is not significant needs to be noted carefully because it goes to indicate that the much cherished goal of the NFP of releasing cow dung for manure is far from realization.

TABLE II—GROWTH RATES OF OUTTURN OF FOREST PRODUCTS

ALL INDIA (1951-62)

Classification	Industrial wood		Fuel wood		Total	
	Quantity	Value†	Quantity	Value†	Quantity	Value†
Outturn of major forest produce	4.28*	10.85**	2.19	8.13**	2.67	10.26**
	(3.058)	(7.238)	(1.176)	(5.733)	(1.247)	(3.563)
Outturn in cubic ft. per square mile	4.89**	11.60**	2.53**	8.89**	3.30**	11.00**
	(3.57)	(19.23)	(3.92)	(5.12)	(4.67)	(7.30)
Outturn in cubic ft. per '000 inhabitants	2.30	9.34**	-0.11	5.78**	0.69	8.81**
	(1.70)	(6.34)	(1)	(3.42)	(1.08)	(6.85)
Outturn of minor forest produce	—	—	—	—	N.A.	3.49*
						(3.22)

* Significant at 5 per cent. ** Significant at 1 per cent.

Note: The figures in the parenthesis are "t" values.

† Since the outturn was valued on year to year prices, it was not comparable over time and as such this value was deflated by the general index of prices to make the comparison possible.

N.A. Data on quantity not available.

The rate of growth of outturn of industrial wood and fuel wood available per square mile of the forest area has been significant at 1 per cent level of probability both in physical as well as in value terms.

The growth of industrial wood per thousand of population is not significant so far as physical output is concerned. But the same is increasing at a highly significant rate when value is taken into consideration. The outturn of fuel wood in physical terms has declined though the rate is not statistically significant. Viewed from value terms it turned out to be significant. Once again, this points to the fact that we are far from the cherished goal where cow dung will find its way to the fields.

The rate of growth of the outturn of minor products has shown a positive trend which is significant at 5 per cent level of probability. It worked out to be 3.49 per cent in value terms. Since the data on physical outturn of minor products were not available, the growth in physical terms could not be worked out.

On the whole, the information provided so far indicates that we have made a movement towards a more intensive utilization of our forest wealth. This trend, in the context of a decline in the area under forests, seems to threaten the very existence of our forest resources. Further, it means that we are far from bridging the gap between our demand for and supply of forest produce. At the current rate of progress of our forestry work, this gap is expected to increase still further. The demand for industrial wood, for example, has been estimated at 24 million cubic metres in 1975-76⁴ which cannot be met internally howsoever hard we may try. The rising demand and prices of almost all types of forest produce, of course, afford us an economic basis for undertaking new plantations. Dependence on nature alone for rehabilitation and regeneration of our degraded and worked forests will not do. This economic basis can be made more sound by a concentrated effort at developing forest based industries. The 'pre-investment' survey started with the financial help of U.N. special fund towards the close of the Third Five-Year Plan is expected to go a long way in making a detailed assessment of the variety and extent of our existing forest resources so that the same could be further enlarged and put to economic use. This should not mean that the survey can replace the need of a detailed survey of all lands visualized in the NFP so that a balanced and complementary land use pattern can be worked out.

In general, however, we may add that considerable scope exists for "extension forestry." The Second Five-Year Plan stated that "plantations" will be formed along canal banks, on road side avenues in the form of shelter belts and on village waste lands."⁵ Information about the progress of work in this direction is not available. The idea needs to be pursued with vigour, particularly because securing of new lands for forest which are already under some other use is extremely difficult. It is, therefore, suggested that no effort should be spared to plant trees on both sides of nearly 58,000 kilometres of railway track and 76,000 kilometres of roads in the country. Such plantations, besides being productive, will also have protective and stability value for the soil and will go a long way in ameliorating the physical and climatic conditions in general.

4. Fourth Five-Year Plan—A Draft Outline, *op. cit.*, p. 205.

5. Second Five-Year Plan, Planning Commission, Government of India, 1956, p. 303.

APPENDIX I

AREA UNDER FOREST AND THE OUTTURN OF MAJOR FOREST PRODUCTS IN INDIA

Year	Area under forests (sq. miles)	Industrial wood		Fuel wood		Total		
		Quantity ('000 cubic feet)	Value* (deflated) (in '000 rupees)	Quantity ('000 cubic feet)	Value* (deflated) (in '000 rupees)	Quantity ('000 cubic feet)	Value (deflated) (in '000 rupees)	
1951-52	..	2,83,568	1,60,042	1,43,210	3,58,742	39,432	5,18,784	1,82,642
1952-53	..	2,80,642	1,22,465	1,36,486	3,25,859	38,352	4,48,324	1,74,838
1953-54	..	2,80,732	1,16,269	1,41,964	3,20,971	24,918	4,37,240	1,66,881
1954-55	..	2,78,859	2,01,469	1,88,280	3,11,592	36,774	5,13,061	2,25,054
1955-56	..	2,71,684	2,02,446	2,60,851	3,26,057	38,482	5,28,503	2,99,332
1956-57	..	2,72,643	1,84,303	2,08,921	3,32,732	51,384	5,17,035	2,60,305
1957-58	..	2,74,414	1,92,255	2,18,983	3,60,191	47,926	5,52,446	2,66,900
1958-59	..	2,69,910	1,97,228	3,20,143	3,91,238	54,902	5,88,464	3,65,045
1959-60	..	2,68,132	2,18,326	3,66,126	3,90,798	67,830	6,09,124	4,33,956
1960-61	..	2,66,236	1,98,059	3,23,464	4,00,294	70,217	5,98,353	3,93,681
1961-62	..	2,68,346	2,06,181	3,36,313	3,65,398	64,467	5,71,579	4,00,779

* Value of the outturn was deflated by the general price index of all commodities.

Source: Indian Forest Statistics published by the Directorate of Economics and Statistics, Ministry of Food and Agriculture, Government of India.

APPENDIX II

OUTTURN OF INDUSTRIAL AND FUEL WOOD IN CUBIC FEET PER SQUARE MILE

Year	Value* of minor forest product ('000 rupees)	Industrial wood		Fuel wood		Total		
		Quantity (c. ft.)	Value* (Rs.)	Quantity (c. ft.)	Value* (Rs.)	Quantity (c. ft.)	Value* (Rs.)	
1951-52	..	70,588	439.19	420.22	984.47	122.04	1,423.66	442.26
1952-53	..	59,407	331.34	369.28	881.65	103.77	1,213.00	473.06
1953-54	..	60,303	309.14	377.46	853.42	66.25	1,162.56	443.71
1954-55	..	79,025	526.17	491.72	813.77	96.04	1,339.93	587.76
1955-56	..	86,675	518.83	671.11	838.87	99.01	1,357.70	770.12
1956-57	..	75,135	463.30	525.19	836.43	129.17	1,299.74	654.36
1957-58	..	78,801	475.69	539.63	887.61	118.16	1,361.37	657.73
1958-59	..	74,446	476.05	772.73	944.33	132.52	1,420.38	881.11
1959-60	..	79,734	515.77	864.93	923.22	160.24	1,438.99	1,025.17
1960-61	..	89,107	457.73	747.55	925.11	162.27	1,382.83	909.82
1961-62	..	96,772	465.73	759.69	825.39	145.63	1,291.12	905.31

* Value of the outturn was deflated by the general price index of all commodities.

Source: Indian Forest Statistics, *op. cit.*

APPENDIX III

OUTTURN OF INDUSTRIAL AND FUEL WOOD IN CUBIC FEET PER THOUSAND INHABITANTS

Year	Industrial wood		Fuel wood		Total	
	Quantity (c. ft.)	Value* (Rs.)	Quantity (c. ft.)	Value* (Rs.)	Quantity (c. ft.)	Value* (Rs.)
1951-52	439.19	420.22	984.47	122.04	564.39	540.01
1952-53	331.34	369.28	881.65	103.77	436.37	486.33
1953-54	309.14	377.46	853.42	66.25	414.16	505.69
1954-55	526.17	491.71	813.77	96.04	722.47	675.18
1955-56	518.83	671.11	838.87	99.01	745.15	960.12
1956-57	463.30	525.19	836.43	129.17	675.99	766.28
1957-58	475.69	539.63	887.61	118.10	700.60	798.00
1958-59	476.05	772.73	946.33	132.52	730.72	1,186.11
1959-60	515.77	864.93	923.22	160.24	814.28	1,365.52
1960-61	457.73	747.55	925.11	162.27	743.92	1,214.95
1961-62	465.73	759.69	825.39	145.62	768.34	1,253.28

* Value of the outturn was deflated by the general price index of all commodities.
 Source: Indian Forest Statistics, *op. cit.*

THE ROLE OF FIREWOOD IN THE INDIAN ECONOMY*

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The purpose of this paper is to assess the role of firewood in meeting the energy needs of the Indian economy. Some implications of this study for the development of forestry in the country are also examined.

Firewood is a major produce of the Indian forests. Excluding minor forest products, wood is the primary forest produce in India. Fuel wood, as distinguished from industrial wood or timber, constitutes 70 per cent of the total wood outturn of the Indian forests, though the value of this timber is almost five times that of the fuel wood.

* This paper is part of a larger study entitled "Demand for Firewood in India," being prepared by the authors at the Institute of Economic Growth, Delhi.