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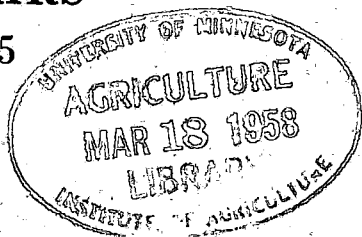
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**Agriculture
and Forestry:
Competition or
Coexistence?**

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By S. R. SEN

Ministry of Food and Agriculture, Delhi

INDIA

THERE was a time—a millennium or so back—when the broad picture of India was that of a sea of forests with scattered islands of cultivation. The economic and cultural life of the country centred largely around forests and rivers and both were held to be sacred. *Rigveda*, the oldest religious book of the Hindus, has a striking hymn to the Goddess of Forests. *Manusamhita*, the ancient Hindu law code, regards the destruction of trees as a serious offence and prescribes a heavy penalty for it. *Agni Puran*, another Hindu scripture, goes so far as to say that a man who plants trees for the welfare of the public obtains absolute bliss. Many famous events in the history of Indian civilization are associated with forests. *Mahabharata*, the great epic, was written in the sacred groves of *Naimisharanya*. The culture of India gathered strength in the *Tapovanas* all over the country where the sages lived and men of affairs spent their retired life. The race memory of the Hindus is intertwined with the beauties of *Nandavana*, with dramatic events in *Dandakaranya*, with the tragic atmosphere of *Ashokavana*, and the story of Krishna is inseparable from that of *Brindavana*. But all these places and many others which are still called *aranya* or *vana* (or forest) are no longer forests in reality. Most of them are now villages or towns and in some deforestation has gone to such an extent that not a single tree can be seen.

As the pressure of population increased it was natural that agriculture should encroach more and more on the forests. The life which centred around forests soon became centred around agriculture. It was, however, after the Muslim invasion of the country that the clearance of forests began to assume serious proportions. While the old Hindu tradition held forests to be sacred and discouraged cutting down trees, the new invaders did not have the same religious or sentimental scruples against destroying them, although they were fond of gardens and orchards and planted many noble avenues around their seats of government. They pursued a deliberate policy of encouraging agriculture at the expense of forests because the former yielded more revenue. And once the restraining influence of the state was removed, the increasing pressure of population accelerated the

process of deforestation in the country. Occasionally, of course, villages relapsed into jungle when they were depopulated by war, famine or disease. But by and large forests fought a losing battle throughout the centuries against encroaching agriculture.

During the early years of British rule, when conditions were unsettled, reckless destruction of forests went on unchecked. The East India Co. was more interested in immediate gains than in long-term benefits to the country. With the transfer of authority in 1857 from the East India Co. to the British Crown, however, there was a welcome change of emphasis from immediate gains to long-term benefits. The rapidly shrinking supplies of timber and firewood and the extensive soil erosion which followed deforestation compelled the government to pay some attention to the urgent need for the preservation of the forest wealth. In north-western India, particularly along the rivers Yamuna and Chambal, and in the south along the banks of Krishna and Kaveri, soil erosion had already become very extensive. On the mountain reaches too, especially in the Siwaliks and the Nilgiris, the cutting down of trees was followed by extensive soil erosion. In Bihar, Orissa, Assam and west Bengal floods caused by the silting up of river beds became very common after the destruction of forests. In Rajasthan extensive areas which were humming with life not very long before were engulfed by the advancing sands of the great Thar desert which itself was to some extent the result of man's thoughtless exploitation of the land surface in the past. Need was felt, therefore, for a well-defined forest policy in the interest of the economic and physical welfare of the country. The first Inspector General of Forests was appointed in 1863 and this marked the beginning of a rational management of the forests. In 1894 the Government of India issued a Resolution on its forest policy which was perhaps the first of its kind in the world. The Resolution was based on the following main principles:

- (i) The sole object to which the management of forests is to be directed is to promote the general well-being of the country.
- (ii) The maintenance of adequate forests is dictated primarily for the preservation of climatic and physical conditions of the country and secondly to fulfil the needs of the people.
- (iii) Subject to these conditions—
 - (a) Permanent cultivation should come before forestry.
 - (b) The satisfaction of the needs of the local population at

non-competitive rates, if not free, should override all considerations of revenue.

- (c) After the fulfilment of the above conditions, the realization of the maximum revenue should be the guiding factor.

But this policy related only to state forests in the then British Provinces and did not apply to private forests or to the 500 or so Indian states. Moreover, the explicit acceptance of the principle that permanent cultivation should necessarily come before forestry led to a large-scale encroachment by agriculture into forest lands outside the forest areas which belonged to the state. Another factor responsible for the extensive destruction of forests was the system of shifting cultivation which continued unchecked in some of the areas inhabited by primitive tribes. Besides, during the first and second World Wars when there was a shortage of iron and steel, coal and petroleum, there was an indiscriminate cutting down of trees both for timber and for fuel with the tacit consent and sometimes even active connivance of the government. The Grow More Food Campaign, which was launched in 1943 soon after the Bengal Famine, openly advocated large-scale reclamation of virgin lands, a considerable proportion of which came either from grass lands or from forests. The relation between forestry and agriculture was still one of competition and not of coexistence.

As a result the position today is that out of a total geographical area of 328 million ha.,¹ 120 million ha. are under crops, 28 million ha. are under fallows, 46 million ha. are either grass lands, groves and orchards or cultivable waste which can be gradually reclaimed and brought under cultivation and only 73 million ha. are under forests. The rest of the area is either barren and uncultivable or put to non-agricultural uses (Table 1).

The wide variations that obtain in the physical features, soil and climate of India give rise to a large variety of natural vegetation—tropical, sub-tropical, temperate as well as alpine type—in crop lands as well as in forests. Areas at a height of 3,750 metres² and over above sea level contain alpine vegetation. Below that, at heights of from 2,000 to 3,500 metres, temperate vegetation with deciduous and coniferous trees is most common. In the lower parts of the hills and in the plains, tropical vegetation is found, which is by far the most

¹ 1 ha. = 2.47 acres.

² 1 metre = 3.28 ft.

common in the country though it differs widely from place to place according to relief and humidity. West of the great band of the Ganges at Rajmahal the indigenous vegetation is that of a dry country. In the extreme west such trees as exist are leafless during the dry season. Towards the east, where the rainfall is heavy, the vegetation on the contrary is luxuriant with evergreen plants and trees. This is also true of the coastal belts of the south. On the loftier parts of the Deccan plateau, where rainfall is low, only small trees and grasses grow. In the centre of the country, monsoon forests generally exist except in the drier parts where grasses constitute the main vegetation.

TABLE I. *Land use in India*

	<i>Million ha.</i>
1. Total geographical area	328·1
2. Area for which land use statistics are available	312·3
Of which:	
(i) Forest land	73·3
(ii) Net area sown to crops	119·9
(iii) Fallow land	28·0
(iv) Permanent pastures and other grazing land	8·4*
(v) Miscellaneous tree crops and groves (not included in net area sown)	13·6*
(vi) Cultivable waste	23·5*
(vii) (a) Land put to non-agricultural uses }	
(b) Barren and uncultivable land }	45·4

* Excludes 0·2 million ha. for which break-up into (iv), (v) and (vi) is not available.

Although there is thus a very wide variety of vegetation which is reflected in the forests as well as in the agriculture, the proportion of the forest area is rather low compared with that of most of the progressive countries of the world.

It will be seen from Table 2 that the forest area *per caput* in India is amongst the lowest—only 0·2 ha.—and that the proportion of forest area to total land area is very low (22·3 per cent.) compared with countries like Japan (61·8 per cent.) and Sweden (56 per cent.). It is no doubt higher than in countries like the United Kingdom (6·5 per cent.) or Italy (19·2 per cent.) but the latter are compensated for both by their temperate climate and relatively high proportions of grass lands and meadows. In view of her tropical climate, periodic monsoons, steep mountain slopes, lower forest productivity and a predominantly agricultural population, most experts feel that a much larger proportion of land should be kept under forests in a country like India. In fact they recommend that the minimum of forest land that India should aim at should be about a third of the total land area rather than a meagre fifth. But the picture is even worse when one

takes into account the distribution of the forests. As will be seen from Table 3, most of the forests are concentrated in a few states only, viz.

TABLE 2. *Land use in India and other countries*

Countries	Total land area	Forest area	Agricultural area	Brush and other area	As percentage of total land area		Per caput	
					Forest area	Agricultural area	Forest area	Agricultural area
					Million hectares			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Total Asia	2,700·5	566·8	751·3	1,382·4	21·0	27·8	0·4	0·5
India	328·1 ^(a)	73·3	169·9	69·1	22·3	51·8	0·2	0·5
Burma	67·7	39·0	8·8	19·9	37·6	13·0	2·0	0·5
Ceylon	6·3	3·5	1·4	1·4	55·6	22·2	0·4	0·2
China	940·8	80·5	287·5	573·0	8·6	30·5	0·18	0·6
Indonesia	190·4	121·0	11·0	58·4	63·5	5·8	1·6	0·1
Iran	163·6	19·0	26·8	117·8	11·6	16·4	1·0	1·4
Japan	36·6	22·6	4·8	9·2	61·8	13·1	0·3	0·06
Thailand	41·6	32·1	7·8	1·7	77·2	11·2	1·6	0·4
Total Europe	479·0	135·7	241·0	102·3	28·3	18·7	0·3	0·5
France	55·0	11·4	33·5	10·1	20·7	60·9	0·3	0·9
Italy	29·3	5·6	20·6	3·1	19·2	70·3	0·12	0·4
Western Germany	24·0	6·7	14·2	3·1	28·1	59·2	0·14	0·3
United Kingdom	24·1	1·6	19·5	3·0	6·5	80·9	0·03	0·4
Sweden	41·1	23·0	5·7	12·4	56·0	13·9	3·2	0·8
Finland	30·6	21·7	3·4	5·5	70·9	11·1	5·3	0·8
Spain	49·9	12·6	33·1	4·2	25·2	66·3	0·4	1·1
U.S.S.R.	2,189·3	742·6	349·0	1,097·7	33·9	15·9	3·5	1·6
Total North and Central America	2,307·4	721·9	595·0	990·5	31·3	25·8	3·4	2·8
U.S.A.	770·9	252·5	458·9	59·5	32·8	59·5	1·8	3·3
Total South America	1,750·5	861·0	322·5	567·0	49·2	18·4	7·4	2·8
Argentina	277·8	70·0	145·1	62·7	25·2	52·2	3·9	8·1
Brazil	846·4	480·2	51·3	314·9	56·7	6·1	8·6	0·9
Total Africa	2,970·3	801·6	664·2	1,504·5	27·0	22·4	4·0	3·3
Australia	770·4	41·4	24·0	705·0	5·4	3·1	5·1	3·0
Total world	13,251·8	3,915·3	2,959·4	6,377·1	29·5	22·3	1·6	1·2

(a) Includes 15·8 million ha. of land for which break-up into (3), (4) and (5) is not available.

Source: Unasylva—An International Review of Forestry and Forest Products, September 1954, F.A.O. (except for figures in respect of India, which are based on later data; the definition of agricultural area adopted in the case of India is the same as that used by F.A.O.)

Assam, Madhya Pradesh, Orissa and Madhya Bharat. In most of the states of northern India the proportion of forest lands to total area is

very much lower than the all-India average. It would appear, therefore, that there is great need not only for increasing the proportion of

TABLE 3. *Forest area of India by Regions/States*

<i>Region/State</i>	<i>Geographical area (million hectares)</i>	<i>Forest area (million hectares)</i>	<i>Forest area as percentage of geographical area</i>
(1)	(2)	(3)	(4)
<i>North/North-West India</i>			
Uttar Pradesh	29.38	4.28	14.6
Rajasthan	33.72	3.39	10.1
Punjab	9.68	1.31	13.6
PEPSU	2.60	0.08	2.9
Jammu and Kashmir	24.03	2.86	11.9
Ajmer	0.62	0.05	7.5
Delhi	0.15	..	0.0
Bilaspur	0.12	0.05	44.2
Himachal Pradesh	2.71	0.93	34.2
<i>East India</i>			
Bihar	18.21	2.94	16.2
Orissa	15.58	6.09	39.1
West Bengal	7.97	1.08	13.5
Assam	22.02	6.85	31.1
Manipur	2.23	0.60	27.0
Tripura	1.04	0.90	85.8
<i>South India</i>			
Andhra	16.48	3.79	24.1
Madras	15.63	3.08	19.7
Mysore	8.63	1.37	15.9
Travancore-Cochin	2.37	0.79	34.4
Coorg	0.41	0.29	71.1
<i>West India</i>			
Bombay	28.82	5.26	18.2
Saurashtra	5.53	0.24	4.3
Kutch	4.40	0.05	1.2
<i>Central India</i>			
Madhya Pradesh	33.74	16.16	47.9
Madhya Bharat	12.05	4.33	35.9
Hyderabad	21.28	3.32	15.6
Bhopal	1.78	0.56	31.4
Vindhya Pradesh	6.11	2.00	32.7
Andaman and Nicobar Islands	0.83	0.61	73.5
Total India	328.12	73.26	22.3

forest area for the country as a whole but also for a redistribution of it. In other words, while there may still be some scope for clearance of forest lands in Madhya Pradesh, Orissa and Madhya Bharat there

is a great need for afforestation in states like Punjab, U.P., Bihar, Bengal, Bombay, Hyderabad and Madras.

Forests have both protective as well as productive functions. From both these points of view a stage has come for India when forests and agriculture are no longer competitive but primarily complementary. In fact one can even make out a fairly strong case for transferring some of the marginal lands from agriculture to forests and for concentrating on more intensive farming on the better types of soil available. This should not create any serious difficulty for agriculture as such. Yields per acre in India today are very much lower than in most countries with comparable climatic and soil conditions. This shows that with proper planning and effort it should not be difficult to increase the yields very substantially even on the basis of known techniques. Dr. Burns, who has made a careful study of the technological possibilities of agricultural development in India, has pointed out the very large potentialities in this respect,¹ a fact which has also been amply demonstrated in recent years by the various crop competitions held in India in which yields as high as from five to six times the average yield of paddy and from four to five times the average yield of wheat have been obtained by the more enterprising Indian cultivators, even by following indigenous methods on small farms, simply through greater care and better and more extensive use of water, fertilizers and good seeds.

But in practice no net diminution of area under cultivation would be really necessary. If planned afforestation is done on all lands which are now classified as 'cultivable waste' and 'barren and uncultivable land' and trees are planted on edges of fields and roads and fuel forests grown on the poorer lands around the villages, considerably more trees can be planted without encroaching on the cultivated area. New techniques of soil conservation made possible by the development of mechanized equipment mean that, even if the minimum area that should be maintained under forest cover for purely protective purposes cannot be substantially increased, there are possibilities of carrying on agriculture and horticulture in such a manner that there will be a penumbra of vegetal cover around this minimum forest cover which would adequately serve the protective functions expected from forests. These developments have further reduced any possibility of competition between forestry and agriculture. Today both have to be regarded as two aspects of the same fundamental problem, viz. the

¹ Dr. Burns, *Technological Possibilities of Agricultural Development in India*.

optimum use of land such as would ensure the best soil equilibrium. While an appropriate combination of forests, grass lands, orchards and crop lands is essential for the protection of the soil itself, different combinations of the four are possible and it is only necessary to choose such a combination as will be the most economic and beneficial not only in the immediate future but also in the long run. But it is necessary to bear in mind not only the role that forests are expected to play in protecting the soil but also their role in providing mechanical protection as wind-breaks, in the fixation of shifting sands, in ensuring water supplies, especially by preventing the silting up of rivers, canals, &c., in air purification and maintenance of the health of the countryside and in influencing the climate in general.

In addition to this possible extension of the area under forests and tree lands, it would also be necessary to readjust the regional distribution of forests to a certain extent so as to make it more rational and to supplement this minimum forest cover with a penumbra of other vegetal cover in such a manner as would not seriously encroach on crop lands and yet fulfil the protective functions which one would expect from the plant cover provided by the forests.

Although the productive functions of forests in India are not *prima facie* so important as their protective functions, still they are not negligible. Compared to the 50 per cent. of the national income which is contributed at present by agriculture, the direct contribution of forestry, viz. only 0.7 per cent., may appear to be very small. But forests have a marginal as well as a potential importance which is much higher than this figure would indicate. Besides supplying timber for buildings, transport, mining and defence requirements, forests in India are an important source of raw material for sports-goods, packing cases, plywood, bobbins for the textile industry, match, paper, plastic and rayon industries, &c. Amongst the minor forest products which are commercially important may be mentioned gums, resins, medicinal herbs, canes, grasses, myrobalan and other tanning material, sandal-wood oil and mohwa seed. Animal products such as honey, beeswax, lac, bones, hides and horns obtained from forests are also of considerable economic importance. The total value of major and minor forest produce was estimated at Rs. 415.6 million¹ in 1953-4. This figure, however, could easily be multiplied several times with a more scientific and better organized exploitation of the country's forest resources.

¹ Rs. 1 = 15. 6d. = \$0.21.

Besides the above products, forests in India make a very large contribution towards the development of agriculture itself. The farmer gets his building material from forests, grazes his cattle in nearby forest lands, uses the forests as wind-breaks and shelter belts and above all saves cow dung for manurial purposes wherever he gets an easy access to fuel wood from nearby forests. This last point is of considerable importance for Indian agriculture. Today about two-thirds of the total cattle dung produced in India is burnt as fuel because there is a shortage of other fuel in most villages. If fuel wood could be supplied to the farmer, he could put this cattle dung on the land and increase the fertility of the soil considerably.

It is in recognition of the great importance of both the protective and productive functions of forests to the Indian economy and especially for ensuring the best possible land use and land management in the country leading to a balanced development of forestry and agriculture that the Government of India have recently taken a number of important measures. In June 1952 they inaugurated the *Vana Mahotsava*, or the festival of forests, which brought to the forefront the importance of forests in general in a predominantly agricultural country like India. The slogan 'Trees mean water, water means bread and bread is life' soon caught the imagination of the people. Although India's culture was originally born and cradled under the shade of mighty forests and the planting and protection of trees were once part of its socio-religious traditions, tree-mindedness had disappeared from the popular consciousness in recent times. The *Vana Mahotsava* was designed to revive it and create an enthusiasm in the popular mind for the preservation of forests and planting of trees. The campaign evoked an encouraging response from the people and during the last five years about 120 million trees have been planted by the people themselves. Of these about 60 per cent. have become established. The mass consciousness aroused by this festival was also supplemented by an increasing activity on the part of the Forest Departments. A Board of Forestry was constituted with a view to ensuring an all-India integration of forest policy pursued by the various states and the formulation of a new forest policy taking into account the new developments that had taken place in the economic and political fields since the formulation of the first forest policy in 1894. This new policy, based on the following six paramount needs of the country, was announced in May 1952:

1. the need for evolving a system of balanced and complementary

land use, under which each type of land is allotted to that form of use under which it produces most and deteriorates least;

2. the need for checking
 - (a) denudation in mountainous regions, on which depends the perennial water supply of the river system whose basins constitute the fertile core of the country;
 - (b) the erosion progressing apace along the treeless banks of the great rivers leading to ravine formation and on vast stretches of undulating waste lands depriving the adjoining fields of their fertility,
 - (c) the invasion of sea-sands on coastal tracts, and the shifting of sand dunes, more particularly in the Rajasthan desert;
3. the need for establishing tree lands wherever possible for the amelioration of physical and climatic conditions promoting the general well-being of the people;
4. the need for ensuring progressively increasing supplies of grazing, small wood for agricultural implements and in particular of fire wood to release the cattle dung for manure to step up food production;
5. the need for a sustained supply of timber and other forest produce required for defence, communications and industry;
6. the need for realization of the maximum revenue consistent with the fulfilment of the needs enumerated above.

In the light of this policy the forests have been classified as follows :

- (a) Protection forests, namely those which must be preserved or created for physical and climatic reasons. The policy has emphasized the need for reconditioning the mountain regions, river valleys and coastal lands by establishing protective forests over larger areas and preserving the existing ones.
- (b) National forests, namely those which have to be maintained and managed to meet the needs of defence, communications, industry and other general purposes of public importance. It has been stressed that cultivation should not be allowed to encroach upon these valuable timber-bearing forests and as far as possible they should be developed for attaining national self-sufficiency in timber supplies.
- (c) Village forests, namely those which have to be maintained to provide firewood to release cow dung for manure and to yield small timber for agricultural implements and other forest

produce for local requirements and to provide grazing for cattle. Village forests are essential to enable the farmyard manure to be diverted to the fields and to provide fodder for cattle. Without fuel trees, therefore, the fertility of the soil cannot be replenished.

- (d) Tree lands, namely those areas which though outside the scope of the ordinary forest management are essential for the amelioration of the physical conditions of the country. The Land Transformation Programme of the Government of India envisaged the planting of 300 million trees in ten years.

Since the correct solution of the land problem is to evolve a system of balanced and complementary land use under which each type of land is allotted to that form of use for which it is best suited, the New Forest Policy has specifically recommended a detailed survey of lands with a view to their proper utilization. It has emphasized that the role of forests in a national economy, both protective and productive, entitles forests to an adequate share of land. It proposes that the country as a whole should aim at maintaining one-third of its area under forests. There will, of course, be regional variations. As an ensurance against denudation, a much larger percentage of land, probably 60 per cent., may have to be kept under forests in the Himalayas, the Deccan and other mountainous tracts liable to erosion. In the plains, however, the proportion may be lower, say 20 per cent., and, in view of the pressure of agriculture, efforts for the extension of tree lands would have to be centred on river banks and other convenient places not suitable for cultivation. It has been recognized that forests should be extended over waste lands suitable for the purpose and deforestation should be allowed for extension of permanent agriculture only where the area under forest is above the minimum requirement or where some equivalent area can be afforested in a more suitable zone in the neighbourhood. Replacement of useless shrubs and jungles by plantations of valuable trees is also a part of this programme.

Another important development that has taken place recently is the formation of a Soil Conservation Board in December 1953 to organize, co-ordinate and initiate soil conservation, to assist the states and River Valley Authorities in drawing up schemes for soil conservation, to arrange for the training of technical personnel and to recommend financial assistance for schemes to states and the River Valley

Authorities. The Board is also required to devote attention to the problem of desert control. It has already approved schemes for the immobilization of the Kutch desert and for the afforestation of the U.P. and Rajasthan deserts. A Desert Afforestation Research Station has been established at Jodhpur. It is proposed to create a green belt on the western border of Rajasthan about 55 km. long and 7 km. broad. Further, steps are being taken to increase the forest area in Rajasthan by about 50 per cent., for the creation of wind-breaks round agricultural fields and for creating subsidiary forest belts, more particularly between the outer desert and the inner arid zone.

The demand for agricultural as well as forest products will increase with the increase in population, the rise in the standard of living of the people and the development of industries. The increase in demand will be met, it is hoped, by planned development of both agricultural and forest resources. The First Five Year Plan of the country (1951-2 to 1955-6) had to give the highest priority to the development of agriculture and irrigation and more than one-third of the total expenditure was earmarked for these two items because the immediate problem was food shortage. But even then the First Five Year Plan did not neglect forests altogether and provided for a total expenditure of about Rs. 120 million for the development of forestry. The normal expenditure for forest administration was also increased from Rs. 85 million in 1950-1 to over Rs. 100 million in 1953-4. Special steps are being taken for the exploitation of the virgin forests of the Andaman Islands and of the Himalayas and extensive research on the utilization of forest products is being conducted at the Forest Research Institute at Dehra Dun.

Now that the food shortage of the country has been largely met, it is proposed to put greater emphasis on balanced land use and land management in the Second Five Year Plan. This will mean greater emphasis on the development of forests and grass lands. In order to meet the food shortage even marginal lands in certain areas were put under the plough. It is proposed that future policy in this regard should be not only to grow more food but to increase the general productivity of land. With this end in view it is proposed to concentrate on intensive cultivation on such lands as are really good for crop production and to devote other lands either to orchards or to pasture or to forests, whichever is likely to yield the best results. It is also proposed to make a planned effort to convert a portion of the 23.5 million ha. of land which are now classified as 'cultivable waste'

into grass lands and forests, priority being given to catchment areas of rivers and areas where soil erosion has become acute.

The value of forests is thus being recognized both for conservation of moisture, prevention of erosion and increase in rainfall and for development of agriculture, industries and communications. It has now come to be realized that the interests of agriculture and forestry are no longer competitive. The development of both on complementary lines has been envisaged in the New Forest Policy laid down in 1952 which said that forestry should no longer be regarded 'as a mere handmaid but an indispensable ally and foster mother of agriculture'. The First Five Year Plan, while trying to meet the urgent requirements of agriculture, prepared the ground for a more balanced policy to be followed in future. The Second Five Year Plan, it is expected, will give full effect to this policy and ensure such an integrated development of forestry and agriculture as will secure the optimum land use for the country. Coexistence instead of competition is now the keynote of India's policy. The introduction of modern agricultural and forestry techniques as well as the growing emphasis on multi-purpose river valley projects should also go a long way towards its successful implementation.