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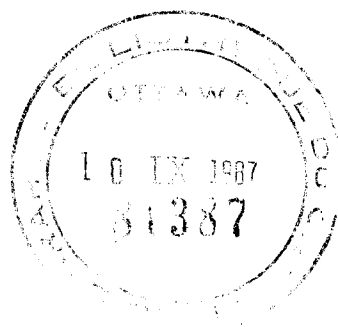
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AGROFORESTRY MODELS AND FAST-GROWING TREES - SOME OBSERVATIONS*

by

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I feel greatly honoured to be here today to preside over the Second Session of this Asian Seminar on Trees and Mycorrhiza.

During the recent IUFRO World Congress in Yugoslavia, one learned scientist remarked that history will look upon the 20th Century as being the time when man's use of the world's forests threatened their very existence. In particular, the widespread depletion of the tropical forest, though not for industrial wood, accelerated rapidly from 1950 onwards and led to their serious loss (and consequent degradation of lands, erosion, floods, etc.) in many areas of the world where they were formerly of great social and economic benefit. But if forest destruction has been a feature of the century so too has forest creation that is, reforestation/afforestation. However, these efforts, so far, have neither been successful in alleviating the problem nor paid enough attention to the interests of the local people. Obviously, new approaches to land use, and/or afforestation, need to be developed and tested to supplement the traditional practices.

In the last few months, I have been screening the large volume of literature that accumulated during the past decade on the subject. It was also timely that I could attend the recent IUFRO Workshop on Agroforestry for Rural Needs in New Delhi, 22-26 February 1987 and listen to the various views expressed on the subject. After reviewing some of this, I came up with the following thoughts/observations/comments/concerns regarding the subject. Perhaps we will be able to discuss some of these during our deliberations this morning.

General Appraisal

1. Agroforestry - the name given to many different technologies in which woody perennials are incorporated into land use systems together with agricultural crops and/or animals - is represented by many age-old traditional systems that have been worked out by farmers and foresters (P.J. Wood - ICRAF 1987).

2. Agroforestry is not a homogenous entity. Rather, it is a range of possibilities, the scope of which varies widely from country to country and sometimes even within the same country. Tree growing by rural people is nothing new; in many parts of the world they are a major element in the local farming/agricultural system. For example, some of the most complex (multi-layered) agroforestry systems are found in the "home gardens" of Indonesia. They are species rich and possess sophisticated spatial structures and dynamics.
3. Agroforestry is thus a new catchword for an ancient practice. The two major areas of research focused on in recent years are:
 - (i) Examination of traditional systems (indigenous forestry practices), their analyses and classification.
 - (ii) The scientific design and application of modern agroforestry techniques for various land use problems. This area of activity has accelerated considerably after the creation of ICRAF in Nairobi in 1978 by IDRC and other agencies.
4. Many planners, however, still consider agroforestry as a traditional strategy for accelerating reforestation (the Taungya system) and enhancing forest production and/or conserve the resource without evicting the farmers/people. Many others view the system as one way of promoting community stability and alleviating rural poverty.

Whatever the views are, modern agroforestry is relatively youthful and needs a more systematic and scientific approach. Some examples of prominent agroforestry systems and practices in Asia are given in Tables 1 and 2.

Why Agroforestry

1. The driving force behind many scientists/administrators/planners/educators' enthusiasm for agroforestry is its perceived promise of a solution (or a partial one) to problems unprecedented

within local economies, among rural populations, in much of the developing world. Under the appropriate conditions, agroforestry has proved itself to be an effective means of providing substantial individual and communal benefits.

2. Most agroforestry practices tend to be labour-intensive, and, in fact, creation of jobs and income in rural regions under acceptable conditions deserve high priority within a relevant developmental policy.
3. Agroforestry with fast-growing trees could thus provide significant benefits to rural farmers. (Note: Market factors could play a significant role in the promotion of fast-growing trees viz-a-viz trees with a rotation age of 25-30 years.)

Research Needs

1. Agroforestry systems are usually site specific. Although most agroforestry systems claim to have dual-purposes, in fact they generally end up having an over-riding objective. This should be thoroughly considered right from the beginning. Research should be focused on well identified target communities, in various ecological conditions, preferably under real farming situations and managed by farmers. Where possible, from the inception of the project such research should preferably be in the farmers' lands with both short and long-term goals. One of the best examples I am familiar with is the Paulownia Agroforestry in China. This system (intercropping agricultural crops with Paulownia species) which has been used in over 150 million hectares has now become an important cultivation system in the flatlands of North China.
2. When dealing with Agroforestry, conventional forestry (save Taungya cultivation) is handicapped by the scope of action and the shortage of trained men, lack of mandate, etc. Trees have to be screened

not only in large plantations and forest reserves, but in areas where they are accessible to those who need them the most. Tree strategies for small farmers need to be worked out. For most of these farmers (if they own land), the average size of their holding is generally 1 - 1.5 ha or less. Some aspects that need to be addressed include design, species, site specifications/environments (as in 'SALT' method for uplands in the Philippines).

Tree selection for agroforestry is a three dimensional activity. We need to know their origin (wild/native/exotic), economic role (subsistence or commercial) and tree functions such as food, fodder, fuelwood, construction as well as soil amelioration i.e., nitrogen-fixing, etc.

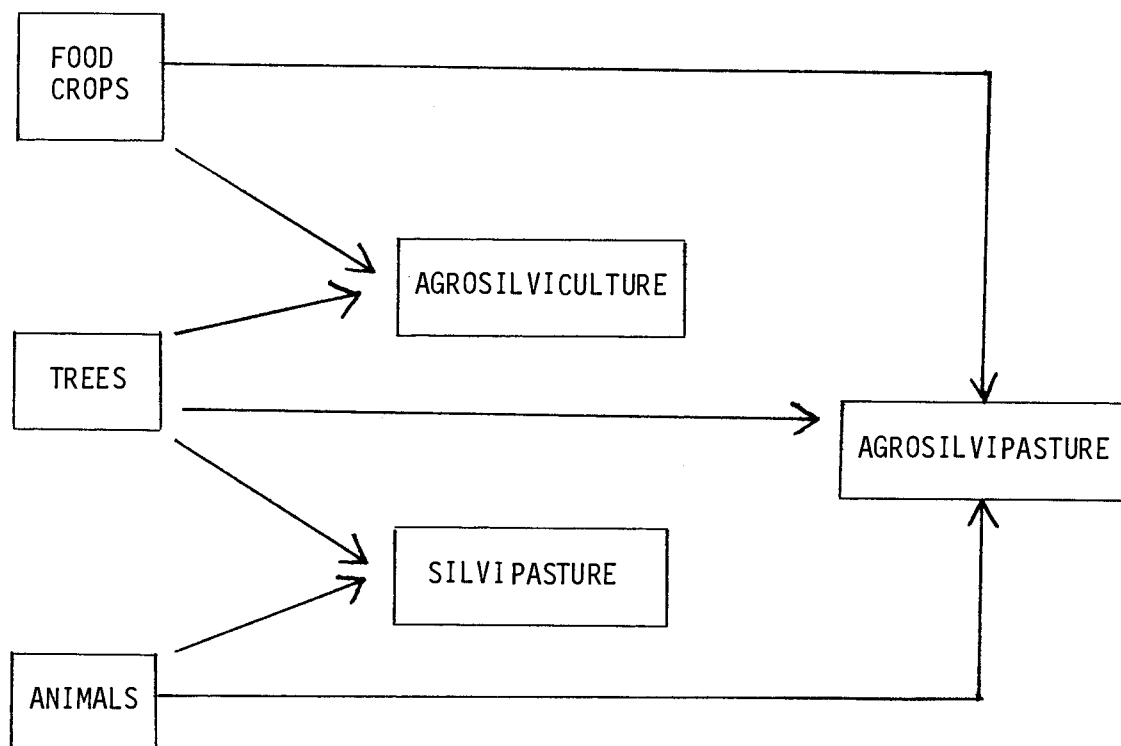
Socio-economic aspects of agroforestry is another area that needs to be looked into. The need for trees is widely dispersed, extremely varied and specific to the people involved. Some areas of concern are:

- why people plant trees (traditions) and the constraints which prevent them from doing so
- tree ownership
- tree growing as a commercial activity
- land tenure/tree tenure

Conclusion

1. Agroforestry is changing rapidly from a descriptive to an experimental activity; it is a multi-disciplinary concept and requires a multi-disciplinary approach based on regional opportunities and constraints. The complexities of agroforestry systems, which involves plants of different types and life-cycles, are greater than those normally associated with agriculture or forest science per se.

2. Despite evidence of successful agroforestry practices, there is still lack of knowledge and little experience on the establishment and management of specific systems under various conditions.
3. In summary, our philosophy is that research in this area should not end up as a Taungya type agroforestry system where shorter term crops are used as a financing and management tool to grow trees.
4. It is our hope that the aim would be to develop perennial multi-strata systems (adaptable by farmers) that would help alleviate rural poverty. Research must therefore be based on locally perceived priorities rather than externally imposed preconceptions. We should also avoid the self-imposing cycle of false expectations and unrealistic goals.
5. Finally, I feel that the deliberate phase out of the project per se should be planned at some point in time to make the project self-sustaining without continued funding support and effort (whether it is from external or internal sources).



Agrosilviculture: Live fences, shelterbelts, Taungya, shifting cultivation systems, intercropping in plantation crops (rubber, oil palm, coconut), commercial trees among crops.

Silvipasture: Pasture in forest plantation or secondary forest, commercial/fruit trees in pasture, fodder trees & shrubs, coconut, plantation crops and cattle, pasture under trees.

Agrosilvipasture: Multipurpose trees with crops and animals, integrated farming system with plantation crops - coconut, oil palm and rubber, agro-tree crops and grazing in forest.

Others: Home gardens, multi-storey plant canopies, fuelwood agroforestry, agrosilva-fishery, swidden farming, SALT (mountain-side polyculture), fruit trees in arid areas.

Table 1. Some examples of prominent agroforestry systems and practices in Asia.

A. SPATIAL ARRANGEMENT

1. Trees along border (shifting cultivation)
2. Alternate strips (erosion control - SALT)
3. Alternate rows (erosion control - hillside)
4. Mixed (tree gardens)
5. Forest net (Paulownia intercropping - 5 x 10 to 5 x 40 m spacing)

B. TIME SEQUENCE

Shifting cultivation, Taungya system, home gardens

C. CROP COMBINATIONS

Forest trees with annuals, Forest trees with perennials, forest trees with annuals & perennials, forest trees with livestock

Table 2. Classification of Agroforestry Systems (see also references by Serrano and FAO).

Suggested Reading

1. Burley, J. and P. Von-Carlowitz (eds). 1984. Multipurpose tree germplasm. Proceedings of a Planning Workshop to Discuss International Cooperation. Washington, D.C., U.S.A, June 1983. Publ. by ICRAF, Nairobi, pp. 298.
2. Burley, J. and J.L. Steward (eds). 1985. Increasing productivity of Multipurpose species. Publ. by IUFRO, Vienna, pp. 560.
3. Foley, G. and G. Barnard. 1984. Farm and Community Forestry. Tech. Report No. 3. Energy Information Programme. Publ. by Earthscan, U.K., pp. 236.
4. Fortmann, L. and J. Riddell et. al. 1985. Trees and Tenure. An annotated bibliography for Agroforesters and others. Publ. by ICRAF, Nairobi and Land Tenure Center, Madison, Wis., pp. 135.
5. Khosla, P.K. and D.K. Khurana. 1987. Proceedings of the IUFRO Workshop on Agroforestry for Rural Needs. Vol. I, 22-26 Feb 1987, New Delhi, India.
6. ACIAR (1986). Multipurpose Australian tree and shrubs for fuelwood and agroforestry. Australian Centre for International Agricultural Research, Canberra.
7. Chinese Academy of Forestry (1986). Paulownia in China: Cultivation and Utilization. Publ. by Asian Network for Biological Sciences and International Development Research Centre.
8. Zhu, Zhao-Hua, Fu Mao-yi, G. Dhanarajan and C.B. Sastry, 1987. Agroforestry in China - An Overview. Paper presented at the IUFRO Workshop on Agroforestry, 22-26 Feb 1987, New Delhi, India.
9. FAO. 1985. Forests, Trees and People: Forestry Topics Report No. 2, FAO, Rome.
10. Serrano, R.C. 1986. Agroforestry systems and cropping patterns classification and comparison. Pesam Bulletin, Vol. VI (3). University of the Philippines at Los Banos, Philippines.
11. Huxley, P.A. (ed). 1983. Plant Research and Agroforestry. Publ. by ICRAF, Nairobi, pp. 619.