PEOPLE, TREES AND RURAL DEVELOPMENT: THE ROLE OF SOCIAL FORESTRY

Hans M. Gregersen

The basic issue in social forestry is how to change land use so that people get what they need on a sustainable basis from a relatively fixed or even shrinking land base.

A village group in the Republic of Korea plants a small community fuelwood plantation. A Costa Rican landowner plants trees along her field as a living fence and as source of fuelwood. Filipino farmer's plant trees that they will sell later to the Paper Industries Corporation of the Philippines for pulpwood. Rural landless people in West Bengal, India, plant, tend, and benefit from trees they grow on government lands. Villager in the Majia Valley of Niger plant trees along fields for windbreaks and fuelwood. Villagers in Thailand and Nigeria intercrop trees with food crops. All of these are examples of social forestry.

High-level decision-makers have begun to realize that social forestry can contribute both directly and indirectly to improving the environment, increasing food and energy security, and reducing unemployment, which are three key issues preoccupying most world leaders. Two ingredients are common in successful social forestry programs: widespread local participation backed by higher level political support, and sustainable, productivity-increasing technologies that are adaptable to local circumstances and acceptable to local populations.

The term “social forestry” is used interchangeably with “farm and community forestry” and “forestry for local community development” (Food and Agriculture Organization of the United Nations 1978). The terms refer to a broad range of tree- or forest-related activities undertaken by rural landowners and community groups to provide products for their own use and for generating local income. Social forestry may also include governments or other groups planting trees on public lands to meet local village needs.

In conventional industrial production forestry, trees are also used to meet the needs of people, and social forestry often involves farmers and other small holders producing commercial tree crops. In that sense, all types of forestry can contribute to social goals. There is a continuum from the large-scale, industrial forest based corporation, with its objectives related to sales and profits, to the small village or rural farmers growing trees to meet their own needs. The primary focus in social forestry is on involving community and individual farmers with trees and on analyzing how people grow trees and use them while they grow.

Why is Social Forestry Important?

Social forestry can contribute significantly to improving the livelihood of poor rural people through soil improvement. It can also supply wood for home construction, farm building, fencing, fuel, and fiber; food supplements; windbreak protection; and shade and fodder for livestock (Fig. 1). Social forestry can provide income for farmers and rural communities and can help to move people from the frightening and fragile condition of mere subsistence to a better level of living.

Judgment must be used in deciding how and when to integrate trees into farming systems, because trees may also compete with agricultural crops if not introduced appropriately. This is where Agroforestry enters the picture. Agroforestry, or the integration of tree growing into farming systems either spatially or temporarily, is a major tool in social forestry programs involving farmers. While Agroforestry has been practiced for centuries in most parts of the world, only recently has it been subjected to major scientific investigation. The United States, Canada, and a number of other countries recognized the importance of Agroforestry and joined together in 1977 to create the International Council for Research in Agroforestry (ICRAF). From its headquarters in Nairobi, Kenya, ICRAF produces and disseminates much useful documentation dealing with Agroforestry systems (International Council for Research in Agriculture 1986, Raintree 1986, Steppler and Nair 1987). In addition to supporting ICRAF, the United States, through the U.S. Agency for International Development (AID), currently supports other agroforestry-related research and development in Asia, Africa, and Latin America.

Fuelwood is the primary source of energy for poorer urban households and for the vast majority of rural households in developing countries. Total annual consumption of fuelwood in developing countries increased from 1.1. to 1.4 billion cubic meters between 1973 and 1983, and fuelwood currently accounts from more than 80 percent of all the wood harvested in developing countries. According to a survey conducted by the Food and Agriculture Organization (FAO) of the United Nations, 1.1 billion of more than 2 billion persons who are dependent on fuelwood face hardship because over time they have been harvesting wood faster than it has been replenished by natural regeneration and planting (Food and Agriculture Organization of the United Nations 1985a).

Fuelwood scarcity is at the heart of the energy crisis for the rural poor worldwide. Approximately 100 million persons in developing countries suffer from acute fuelwood shortages. Millions are forced to reduce their calorie and nutrient intake because they no longer can obtain the fuelwood needed to cook available foods, nor cant hey afford to buy other fuels. Millions are also cold because they cannot find wood to heat their homes (World Resources Institute 1985). Many rural poor already spend a disproportionately high part (30 percent or more) of their incomes on fuelwood, and the

situation is rapidly worsening in many countries. In some areas, it costs more to heat the pot than to fill it with food.

Social forestry programs that involve millions of people growing trees in and around their farms and villages in one economically feasible solution to the rural energy crisis in many countries. While fuel substitutes for wood may be available, they are too expensive for most rural poor. They cannot afford them now or in the foreseeable future.

The Republic of Korea provides one example of a successful community fuelwood program. About 20,000 village forestry cooperatives reforested the equivalent of more than 1 million hectares with multipurpose species during a 5-year period (Gregersen 1985).

In many countries, such as Costa Rica, the Philippines, Kenya, and Brazil, farmers produce fuelwood that is sold directly or converted into charcoal for sale to industry, city residents, and businesses. In most part of the world once can find small businesses - run by bakers, potters, or tobacco dryers - that depend on wood purchased from rural wood producers or gatherers. To the extent that social forestry programs can produce additional wood to take the pressures off exploitation of the natural forest, such programs also help to promote conservation of the natural forest and to prevent watershed management problems.

Unemployment plagues many developing countries. Growing populations worsen the problem. While social forestry cannot solve this problem, it can contribute significantly in some areas to the creation of jobs and to larger incomes for the rural poor. In many countries, small forest-based enterprises are a major source of off-farm employment in rural areas. For example, in Sierra Leone and Jamaica, forest-based, small-scale enterprise account for more than one-fifth and one-third, respectively, of total employment in the small-scale enterprise sector, which is by far the major employer of rural labor (FAO of the United Nations 1985b). These jobs are diverse and depend on more than just woods; they depend on fruits, mushrooms, nuts, leaves, fibers, and forest game. The multiple-use aspects of trees mean that investment in tree-growing can be quite attractive and profitable for farmers. For example, in the region of San Ramon, Costa Rica, farmers plant trees to shade their coffee crops. As the trees grow, the family use their branches for fuel. When the trees are large enough, they are cut down and the boles are sold for posts. Meanwhile, younger trees have been growing to provide shade and needed fuelwood.

The economics of Agroforestry systems is only now being subjected to serious study. It is becoming evident that complex relationships determine farmer production goals and allocations of land, labor, and capital to tree components in overall farming systems (Arnold 1987).

The connection between employment and social forestry may also be indirect. As mentioned, many rural, nonwood-based industries depend on wood for fuel. Local residents obtain income from growing, harvesting, collecting and selling wood to these industries; in some cases, survival of industries - and thus jobs - depends on the availability of wood fuels from local communities.

Concern for Social Forestry Issues Mounts

Population growth in many regions has led to increasing needs for agricultural land and fuelwood. Increasing efforts to meet these needs have accelerated deforestation and forest degradation and also have led to adoption of nonsustainable land-use practices. At least 7.5 million hectares of closed forests and 3.8 million hectares of open forests and woodlands are being destroyed or degraded each year in tropical developing countries (FAO of the United Nations 1982). Massive deforestation and the fuelwood crisis are the main factors that have drawn worldwide, high-level political and scientific attention to forests and social forestry.

Many governments and most international donor organizations now recognize deforestation and the consequent environmental degradation as one of the world's major issues (Conable 1987). The political will, financial resources, and technology to address these problems are being mobilized (FAO of the United Nations 1987a, World resources Institute 1985). What is needed is a sound basis for planning and galvanizing action broadly and concretely.

During the mid-1970s, the perception of forestry and its role in rural development changed rapidly. Responding to changes in its member countries, FAO initiated work on forestry for local community development (FAO of the United Nations 1978), and the World Bank issued its forestry sector policy paper, which stressed social forestry needs (World Bank 1978). These institutions and other donor agencies began to recognize the critical need to reorient philosophies, policies, and programs toward supporting forestry for local people to encourage rural populations to participate in local forestry and conservation efforts. Similar changes were suggested in research priorities only a few years later (World Bank 1981).

In part, general acceptance of this re-orientation resulted from widespread publicity on both the worldwide fuelwood crisis (Eckholm 1975) and the rapid spread of deforestation in the tropics (Myers 1980). The change also occurred because decision-makers became increasingly sensitive to criticism that rural development and conventional forestry projects were failing to consider local interests, needs, and participation. Evidence mounted about the significant role that trees could play in agricultural systems, in environmental protection, and in the livelihood of many rural people. Finally, foresters, agriculturists, and social scientists began to communicate and learn from each other (FAO of the United Nations 1985c).

From the late 1970s to the early 1980s, new programs were launched at an accelerated pace, accompanied by a tremendous growth in economic development activity related to farm and community forestry, including Agroforestry and wood-energy forestry. Courses were developed, institutions were established or modified to deal with Agroforestry research, significant programs were initiated and funded by multilateral and bilateral development organizations, and large sums of money were invested in community forestry projects in many countries. For example, between 1977 and 1986 some 60 percent of the World Bank's lending for forestry (US$1.3 billion) was for social forestry and related fuelwood and watershed protection projects. This compares to a mere 5 percent in the previous decade, with the remaining 95 percent going to industrial forestry related investments (Gregersen et al [press]).

Overall, multilateral and bilateral aid for forestry development has been growing rapidly over the past decade, and official development assistance for all areas of forestry is now nearing $1 billion per year, with nearly 50 percent going to programs related to forestry in land use (mainly Agroforestry and watershed management), fuelwood, and energy. An additional 31 percent goes to forest-based industrial development, and some 15 percent goes to building institutions (FAO of the United Nations 1987a).

Worldwide concern with forestry-related problems led to establishment of the Tropical Forest Action Plan (TFAP), a program initiated to foster increased international support for, and cooperation and coordination of technical assistance and investment in, sustainable development and conservation of tropical forests (FAO of the United Nations 1985d, 1987b). However, TFAP goes far beyond traditional concerns in forestry to embrace a host of objectives that relate more fundamentally to increasing the welfare of poor people in developing countries. TFAP's concerns focus on five areas: upland land use and watershed management; fuelwood and energy; conservation of tropical forest ecosystems; forest-based industrial development; and institution building, including research, extension, and training. These five areas of concern indicate that social forestry is central to the objectives of TFAP.

TFAP is administered by a coordinator housed in FAO in Rome. Regular meetings are held by FAO's Committee on Forestry Development in the Tropical, and the forestry advisors from the major donor countries and multilateral agencies set directions for TFAP and ensure coordination of technical assistance and investment to implement the plan. The focus so far has been on developing national tropical forest action plans in interested countries and on mobilizing technical assistance and investments, to carry out the plans. Social forestry investments, often involving nongovernmental organizations, are a central part of the plans.

A Framework for Planning

Some common elements are involved in social forestry, whether one is dealing with programs related to increases in agricultural productivity, land protection, and rural

fuelwood crisis, or production of products from trees and forests. The first element is local participation. This involves local knowledge and understanding and commitment of local resources - including physical resources as well as institutions - to organize production and to distribute fairly any increased production. The second common element is technological innovation to generate and sustain increases in land productivity. This includes the technology related to an appropriate combination of suitable species; planting, tending, and protection systems; yields; and output uses.

These two elements - local participation and technological innovation for sustainable increasing productivity - bind together the policy issues associated with social forestry's role in development.

Common Element: Local Participation

The basic issue in social forestry is how to change land use so that people get what they need on a sustainable basis from a relatively fixed or even shrinking land base. Only the land users themselves can do it. As Lester Brown, president of Worldwatch Institute, observed (Brown 1986, italics added);

> What needs to be done in Africa are very basic things, like planting trees and planning families. *There has to be a grassroots response.* Africa isn't the kind of situation where the World bank can invest $60 million here and $200 million there and expect instant cures. What is needed is a Peace Corps-style approach. Neither the international aid agencies nor the ministries of African governments can plant trees on a scale needed to reverse the environmental deterioration that's become so widespread in Africa. *The only labor forces that can plant trees on the magnitude needed are the rural populations of Africa*.

On the social and economic site, the issue is how to promote local participation in activities involving a combination of technologies that can simultaneously stabilize the environment and increase productivity. Conservation without economic benefits is difficult to promote. "Production with protection" is a necessary theme in social forestry and one that binds it closely to the philosophy and practices of watershed management.

Program planners can gain local support and involvement by clearly showing local people that a program will meet their objectives, will be feasible, and will provide enough benefits to make it worthwhile. Local participation will take place only if people have the resources to participate, the knowledge of what to do and how to do it, the appropriate mix of incentives, and the institutions to support and sustain their activities. C. Kenny Jordan (1988) discusses in the May issue of the *JOURNAL OF FORESTRY* how development programs assist local people in becoming self-sufficient in tree-growing.

Resources. The key resource in almost any kind of social forestry program is land. In many cases, population pressure on the land is such that large areas are not available for growing trees. In any case, the experience with village woodlots is highly mixed. In general it appears that community "self-help" plantation projects are not as successful as the projects involving small-scale private tree-growing on farmlands and around houses (Noronha 1981, Noronha and Spears 1985, Weber 1982). Both private and communal tree-growing often are complicated by complex local tree and land tenure arrangements (Fortman and Riddell 1985). More recently, interest in rehabilitation of degraded natural woodlands (government or common property) has increased as more information has come to light on the cost-effectiveness and social value of such activities.

Another emerging key factor in the success of social forestry programs is local production and availability of appropriate seedlings. Decentralized nurseries, often established and operated by local village groups or individuals, can provide income, employment, and familiarity with and interest in tree-growing (Gregersen 1982). For example, the incidence of tree-growing by rural people in some areas increases significantly the closer their land is to a nursery (Campbell, pers, commun., AID, India, 1987). In many cases, it has been found that local residents have very small nurseries near their houses where they produce a few seedlings each year for their own use or for family and neighbors. All these factors must be considered when designing a social forestry program.

Knowledge. How best to extend knowledge about tree-growing -what to plant, how, and where-is a question that has preoccupied foresters and others involved with social forestry programs. Successes (e.g., Haiti, Korea, and Nepal) have been achieved by governmental and nongovernmental organizations (NGOs) using local village residents as motivators, "animateurs," or village forest officers who provide technical assistance and guidance. An advantage of the NGO approach is that projects often can avoid the widespread local distrust of government forest officers coming from the outside the area. In some cases, forestry extension is handled by agricultural extension personnel. This can have the advantage of not confusing local farmers when two different extension people give them conflicting advice.

Incentives. Much work has been done to understand the incentives that motivate rural tree-growing and other social forestry activity (Gregersen 1984, McGaughey and Gregersen 1988). It is becoming increasingly clear that market incentives are important in many social forestry programs. Attractive prices provide a major incentive for farmers to grow trees. At the same time, non-market incentive mechanisms have been widely used in social forestry programs such as free seedlings , tools food aid, technical advice and government programs, to reduce uncertainty and risk. In some cases, (e.g., India), landless people have given access to land on which they can grow trees for their own use and for sale.

There is growing documentation on non-market incentive mechanisms clearly need to be used with great caution. Otherwise they could actually harm programs. For example, when free seedling or other subsidies are used in one village, a neighboring village that previously planted some trees may completely quit planting unless it also receive subsidies.

Another problem arises if the villages or other groups become dependent on outside subsidies or other inputs, which can lead to problems when the project is terminated. The continuity issue is critical.

Finally, incentives mechanisms must be tied to the right measure of performance. Hoskins (1979) cites an interesting example from Senegal, where farmers initially were paid to plant *Acacia albida* and experienced about a 70 percent loss. The program then began paying for each living tree that remained six months to a year after planting. Payment was continued for the next 2 years, again based on the number of living trees. Agents involved report that losses were cut dramatically.

Institution. The way in which social forestry programs are institutionalized is critical to their success or failure (Cernea 1985). A major factor determining local response to technological innovation in social forestry is government commitment and response through legislation, technical support, and financial support, both directly and through incentives programs. Such commitment and response, or lack of it, can have a direct effect on local ability, knowledge, interest, and institutions and thus on local participation. The importance of strong support up to the highest levels of government cannot be overemphasized. Such support was crucial to the success of the Republic of Korea's successful fuelwood program mentioned earlier.

NGOs have been particularly successful in developing and implementing social forestry programs. Examples form Haiti, Kenya, and India and group such as CARE and the Pan American Development Foundation come to mind (Gregersen et al. [in press]). The success of NGOs in this area relate to, among other things, their longstanding work in communities, local trust in them, their flexibility and general lack of red tape and bureaucracy, and their experience with grassroots extension. There is wide-spread interest in obtaining greater NGO involvement in social forestry programs and in TFAP activities.

Common Element: Sustainable Increases in Productivity.

The second element common to most social forestry programs is the need for sustainable increases in production from the relatively fixed land base, i.e., increases in productivity. Agroforestry or integrating trees with agriculture to raise land-use productivity can result from growing trees that have multiple purposes. For example, trees can be planted to contain livestock, act as a windbreak, and add nutrients to and protect the soil at the same time. Trees also can provided fuelwood, food and fodder.

A key need is to introduce tree-related technologies for sustainable development before major depletion and degradation occur. Technologies to maintain or increase productivity in a healthy environment are easier and cheaper to put in place than are technologies to rehabilitate land after it has been exhausted. Unfortunately, the benefits from maintaining productivity, in the form of losses avoided, are much less visible and more difficult to identify than dramatic increase in productivity or the sight of a restored environment. Thus, technologies to sustain development and maintain productivity, such as many of those associated with social forestry, have tended to get less support that those technologies association with programs involving dramatic but nonsustainable increases in production of goods and services. Times are changing, however. The balance has been swinging to sustainable technologies and development models in response to an increasing awareness of the longer term problems associated with nonsustainable development and environmental degradation. The significant increase in support in such institutions as the World Bank (Conable 1987) provides one indication of this shift in awareness and interest.

It should be emphasized that even though using social forestry to maintain relatively healthy environments is the ideal situation, there also is tremendous potential for using social forestry to restore or to prevent further degradation of partially or seriously degraded and fragile sites, Such is the case, for example, with many of the degraded natural woodlands of Africa, the depleted lands in the Andes and Himalayas, and lands in the Amazon and other areas where tropical soils are very fragile and have been disturbed by inappropriate land uses.

Research is a key in all this, and the world is responding. The International Union of Forestry Research Organization has in place a Special Program for Developing Countries, which already has held workshop to identify key problems and to initiate active networks of researcher working on specific problems. So far, research on past growing, multipurpose tree species and select problems in utilization have been tackled. AID, which provides some of the funding for this program, is supporting Agroforestry research through such group as ICRAF and through its own field program. Forestry advisors for the major donor countries and multilateral agencies have singled out tropical forestry research to support TFAP as the focus for a high-level meeting of leading donors and others in November 1988. The Rockefeller Foundation, the World Bank, and United Nations Development Programme are organizing the meeting. research related to social forestry will be a central concern of that group.

Learning More

Several comprehensive reviews of social forestry experiences have been completed (Foley and Barnard 1985, Food and Agriculture Organization of the United Nations 1985c). Reviews of Agroforestry work, particularly that done by ICRAF, also are available (Steppler and Nair 1987).

Persons interested in social forestry and the more specific field of Agroforestry can now find regular sources of information in such journal as *Agroforestry Systems and the International Tree Crops Journal* and in newsletter and publications of ICRAF (P.O. Box 30677, Nairobi, Kenya) and of the Social Forestry Network (Regent's College, Inner Circle, Regent's Park, London NWI 4NS). Current literature on the subject also is reviewed in *Social Sciences in Forestry*, a quarterly selected bibliography produced by Jean Albrecht, librarian in the College of Forestry, University of Minnesota (St. Paul, MN 55108).

Summing Up

The challenge for social forestry and agriculture alike is to find locally acceptable, productivity-increasing, sustainable uses for land. the key tasks of those involve in planning and implementing social forestry programs are (a) to understand the relationships involved, including social and economic ones associated with local participation and technological ones necessary for sustainable productivity; (b) to translate this relationships into feasible projects and programs that will be accepted and implemented locally; and (c) to show high-level decision-makers that such activities and programs can contribute directly and indirectly to achieving major national objectives such as those related to food and energy security, employment, and environmental improvement. This latter point is one we foresters often forget: To gain support, we need to relate our potential contributions directly to the larger social and economic problems facing national leaders today.

Literature Cited

Arnold, J.E.M. 1987. Economic consideration in Agroforestry. P. 173-90 *in* Agroforestry: a decade of development, H. Steppler and P.K. Nair, eds. Int. Counc. for Res. in Agrofor., Nairobi, Kenya.

Brown, l. 1986. The Woodlands Forum 3(2):1-4.

Cernea, L. 1985. Alternative units of social organization sustaining afforestation strategies. *In* Putting people first: sociological variables in rural development, M.M. Cernea, ed. Oxford Univ. Press (for World Bank), Oxford U.K.

Conable, B. 1987. Address to the World Resources Institute (May 5). World Bank, Washington, DC.

Eckholm, E. 1975. The other energy crisis: firewood. Worldwatch Inst., Washington, DC. 22 p.

Foley, G., and G. BARNARD. 1985 Farm and community forestry. Earthscan Tech. Rep. 3. Int. Inst. for Environ. & Dev., Washington, DC.

Food and Agricultural Organization of the United Nations. 1978. Forestry for local community development. For. Pap. 7: Food and Agric. Organ,. of the UN., Rome, Italy.

Food and Agricultural Organization of the United Nations. 1982. Tropical forest resources. For. Pap. 30. Food & Agric. Organ. of the UN, Rome, Italy.

Food and Agricultural Organization of the United Nations. 1985a. Wood for energy. For. Topics Rep. (repr.) Food & Agric. Organ. of the UN, Rome, Italy. 40 p.

Food and Agricultural Organization of the United Nations. 1985b. The contribution of small-scale processing enterprises to non-farm employment and income in selected developing countries. FO:MISC/85/4. Food & Agric. Organ. of the UN, Rome, Italy. 83 p.

Food and Agricultural Organization of the United Nations. 1985c. Tree growing by rural people. For.Pap.64. Food & Agric. Organ. of the UN, Rome, Italy.

Food and Agricultural Organization of the United Nations. 1985d. Tropical forest action plan. Food & Agric. Organ. of the UN, Rome, Italy. 159 p.

Food and Agricultural Organization of the United Nations. 1987a. Review of international cooperation in tropical forestry. Secretariat Note FO:FDT/87/3. Food & Agric. Organ. of the UN, Rome, Italy.

Food and Agricultural Organization of the United Nations. 1987b. The tropical forest action plan. Food & Agric. Organ. of the UN, Rome, Italy. 32 p.

Fortman, L., and J. Riddell. 1985. Trees and tenure: an annotated bibliography of agroforesters and others. Land Tenure Cent., Univ. Wisc., Madison, WI. 135 p.

Gregersen, H.M. 1982. Village forestry development in the Republic of Korea-case study. Food & Agric. Organ. of the UN, Rome, Italy.

Gregersen, H.M. 1984. Incentives for afforestation: a comparative assessment. *In* Strategies and designs for afforestation, reforestation and tree planting, F.K. Wiersum, ed. Pudoc, Netherlands.

Gregersen, H., S. Draper, and D. Elz, eds. People and trees: the role of social forestry in sustainable development. World Bank Econ. Dev. Inst. , Washington, DC. (In press.)

Harrison , P. 1987. The greening of Africa. Penguin Books, Inc., New York.

Hoskins, M.W. 1979. Community participation in African fuelwood production: transformation and utilization. Unpub. pap., Overseas Dev. Counc./USAID, Washington, DC. 63 p.

International Council For Research In Agroforestry. 1986. Publications; March 1986. Int. Counc. for Res. in Agrofor., Nairobi, Kenya.

Kenny Jordan, C.B. 1988. Forestry program fights rural poverty. J. For. 86(5):37-41.

McGaughey, S., and H.M. Gregersen. 1988. Investment policies and financing mechanisms for sustainable development. Interam. Dev. Bank., Washington, DC. 126 p.

Myers, N. 1980. Conversion of tropical moist forests. U.S. Natl. Acad. Sci., Washington, DC.

Noronha, R. 1981. Why is it difficult to grow fuelwood? Unasylva 33(131):4-12.

Noronha, R., and J. Spears. 1985. Sociological variables in forestry project design. *In* putting people first:sociological variables in rural development, M. Cernea, ed. Oxford Univ. Press, Oxford, U.K.

Raintree, J., ed. 1986. An introduction to Agroforestry diagnosis and design. Int. Counc. for Res. in Agrofor., Nairobi, Kenya.

Steppler, H. and P.K. Nair.1987. Agroforestry: a decade of development. Int. Counc. for Res. in Agrofor., Nairobi, Kenya. 330 p.

Weber, F. 1982. Review of CILSS forestry sector program analysis papers. For Support Progr., USDA For. Serv. & U.S. Agency for Int. Dev. Washington, DC. 40 p.

World Bank. 1978. Forestry sector policy paper. World Bank, Washington, DC.

World Bank. 1981. Forestry research needs in developing countries-time for a reappraisal? *In* Washington IUFRO Congress proceedings. The World Bank/Food & Agric. Organ. of the UN, Washington, DC./Rome, Italy. 56 p.

World Resources Institute. 1985. Tropical Forest: a call for action. volumes I, II, III. World Resour. Inst., Washington, DC. 126 p.