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BACKGROUND

Each year, some 11 million hectares of the world's remaining tropical forests are converted to other land uses or to wasteland (8). Where the cleared land is developed for sustainable agriculture, deforestation can be beneficial. But most of the forest being cleared today cannot sustain farming or grazing under current practices. Thus, potentially productive forest land is degraded into less productive grasslands and wastelands.

Deforestation can be caused by a variety of factors, depending on the site. In general, it is caused by a complex combination of demographic, cultural, political, and economic forces that are intensified by ever-growing populations in need of food, fuelwood, and employment. These increasing pressures lead to overuse and mismanagement of tropical resources (22) and perpetuate a vicious circle of resource degradation and poverty.

Where human pressure on natural resources increases rapidly, natural vegetation recedes

and soil fertility drops. This triggers a chain of events: adverse changes in microclimates, reduced biologic soil activity, increased wind and water erosion, and pressures to open additional land to compensate for reduced fertility, etc., all leading to yet more pressure and more rapid deterioration of the soil and vegetative cover (26).

Deforestation has economic and environmental consequences for both the developed and the developing world. It jeopardizes U.S. imports of agricultural germ plasm, pharmaceuticals, chemical feedstocks, animals for medical research, tropical hardwoods, veneer, and wood products. Deforestation also limits the effectiveness of U.S.-funded development projects in tropical countries, reduces habitat needed by U.S. migratory wildlife species, and could upset the stability of global climates. Tropical deforestation also increases pressure on world oil supplies and plays a role in the increasing number of economic refugees seeking U.S. entry.

DIVERSITY OF INSTITUTIONS

An enormous amount of institutional activity is occurring worldwide that directly or indirectly affects tropical forest resources. The U.S. Agency for International Development, the United Nations (U. N.) agencies, the World Bank, and others have increased their attention to forestry in recent years. Nonprofit institutions and American corporations also have been involved in the search for solutions to tropical deforestation and forest management problems. And importantly, many tropical nations' governments have come to recognize that deforestation constrains their economies and their development options. Thus, many countries are making institutional changes to

help slow deforestation and accelerate reforestation.

There are at least 600 forestry research institutions in the world, with at least 90 conducting significant programs related to tropical forests (27). The number of implementation-oriented institutions is similarly large. There is also a broad range of private enterprise engaged in the design, development, and implementation of technologies with potential to help sustain tropical forest resources. This paper could not identify every pertinent institution, organization, and firm. Rather, it reviews a selection of the institutions in the United

States and abroad that work to sustain tropical forest resources through basic research, tech-

nology development, technology transfer and implementation, and funding.

THE ROLE OF INSTITUTIONS

It is difficult to generalize about the roles the various institutions play in sustaining forest resources because these differ with the particular objectives of each institution. Indeed, effectively matching institution to task is itself often difficult. Some institutions are set up to support basic research, others to promote implementation. Some act locally, on small scales, while others are organized for large-scale, international, or even global efforts. Many institutions have a mandated focus, whether a particular region or a particular issue. The same individuality is true of funding foundations and the private sector. Each institution, foundation, and firm has unique goals, so each also has unique potentials.

Since the problems relating to tropical forest resources are themselves broad and variable, this institutional diversity can be an asset. With such diversity, it is possible to combat the problems on many fronts, on a variety of levels, and with a range of approaches. This diversity means that there are mechanisms to act both

to plant trees needed for immediate needs and to conduct the research needed to develop sustainable forestry systems for the future. It means there are institutions to work at the village level and others to coordinate international efforts. The institutional diversity also ensures that there will be no unrealistic search for the “one answer” to deforestation problems.

This diversity of function and goals, however, can create problems and inefficiencies. Often, different institutions can work at cross purposes, with or without knowledge of the other’s actions. Other times, there is unnecessary duplication of efforts. On occasion, there can be an unhealthy, and certainly counter-productive, “competition” between organizations or between assistance-giving nations. Often, there simply is a lack of communication among the various groups. Coordination and cooperation must be improved if deforestation is to be combated effectively.