AGROFORESTRY FOR SUSTAINABLE DEVELOPMENT: POLICY LESSONS FROM CENTRAL AMERICA AND PANAMA

By
Dean Current

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For more information, contact:

Dean Current
Department of Forest Resources
University of Minnesota
115 Green Hall
1530 N. Cleveland Ave.
St. Paul, MN 55108 USA

Tel: (612) 624 3400
Fax: (612) 625 5212

For copies of this publication, contact:

Ellen A. Maurer
Communications Director
EPAT/MUCIA Research & Training
University of Wisconsin Madison
1003 WARF Office Building
610 Walnut Street
Madison, WI USA 53705 2397

Tel: (608) 263-4781
Fax: (608) 265-2993
Email: eamaurer@facstaff.wisc.edu

Edited by Ellen A. Maurer
Layout by Sharon Graham and Lesa Langan

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FOREWORD

Policies and projects are responses to national goals, resources, and constraints that guide develop ment project activities. National policies are becoming increasingly sensitive to the idea of making development more sustainable. They are also considering environmental and natural resource management consequences of development. Nowhere is this sensitivity more noticeable than in rural development projects based on natural resources use and conservation.

Because of the importance of the links between policy and projects, the EPAT/MUCIA Forestry, Water, and Watershed Management (FWWM) Team has focused some of its efforts. We are working to introduce sustainability concepts into development projects that concern social forestry, watershed management, upland and dryland conservation and management, and conservation.

This paper by Dean Current is one result.

Dean Current is a forester with anthropology and economics training. He has extensive field expertise gained from years of work in Central America, Indonesia, and Pakistan. His present assignment is with the Centro Agron"mico Tropical de Investigaci"n y Ense$anza (CATIE), Tropical Agricultural Research and Training Center, Turrialba, Costa Rica [note 1] which collaborated with us in the background work leading up to this paper.

In preparing this paper, Current has been particularly sensitive to the policy related lessons that come from the experiences gained in the 11 social forestry programs studied. These lessons have been clearly laid out in the text. They illustrate, once again, the critical nature of the linkages that must be forged between policies and the actions guided by such policies. Too often, the policymaker becomes isolated from issues that appear in the field. We believe that Dean Current's paper will help to reduce that isolation.

Hans Gregersen, Leader
EPAT/MUCIA
Forestry, Water, and Watershed Management Team

ABSTRACT

This paper summarizes results of the evaluation of 11 forestry activities in Central America using a framework of factors related to long term sustainability of the benefits flowing from forestry development activities. Identified problems included: the lack of continuity of support to project sponsored activities once formal projects end, the short term focus of many projects, the lack of interest or capacity of host governments and

institutions to provide continued support to these activities, and restrictive permit procedures and legislation that discourage tree management. Factors that contribute to sustainability include the participation and training of local farmers as promoters, trainers, and employees of projects. Another factor is farmer participation in demonstration plots using technologies that provide obvious short term benefits. Also important is flexibility and agility in the management of projects. This allows inputs to arrive efficiently and permits changes in project design as problems occur. As a result of this review of forestry activities, we present lessons for future project development and policy formulation and reform.

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Resources to carry out the project came from the USAID/MUCIA Environmental and Natural Resources Policy and Training Project (EPAT), the University of Minnesota College of Natural Resources, and the Pew Charitable Trusts. Hans Gregersen and Al Lundgren of the University of Minnesota reviewed and edited the paper.

It would not have been possible to visit the number of forestry activities and meet field and administrative personnel without the support of the CATIE - USAID Regional Office for Central America and Panama (ROCAP) Tree Crop Production Project (Madelena) and its network of project personnel in the region. I particularly would like to thank Project Leader Rodolfo Salazar for his support and assistance which made access to that network possible. The Madele$a project national coordinators and their counterparts in each country, along with their staffs, were key persons in identifying the forestry activities for review and making arrangements for the visits. I thank them for their support.

I would like to thank Luis Ugalde, Hector Martinez, Rodolfo Salazar, Carlos Reiche, and Andy White for their review and helpful comments on preliminary drafts of this paper. Ronnie de Camino and Henry Tschinkel also provided valuable assistance in selecting forestry activities in the region for review. I also thank my wife Kim for her assistance and support in the preparation of this paper.

ACRONYMS

CACH
Centro Agricola Cantonal de Hojancha, Costa Rica (Community Agricultural Centers A "canton" is an administrative unit similar to a county used by many of the governments in Central America).

CARE
Cooperative for American Relief Everywhere

CATIE
Centro Agronomico Tropical de Investigacion y Ensenanza (Tropical Agricultural Research and Training Center)

CENREN
Centro de Recursos Naturales, El Salvador (Natural Resource Center)

COHDEFOR
Corporacion Hondureno de Desarrollo Forestal (Honduran Forestry Development Corporation)

DGF
Direccion General Forestal, Costa Rica (General Forestry Directorate)

DIGEBOS
Direccion General de Bosques (General Directorate of Forests)

EPAT
Environmental and Natural Resources Policy and Training Project

FAO
Food and Agricultural Organization of the United Nations.

FWWM
Forestry, Water, and Watershed Management

MAG
Ministerio de Agricultura y Ganaderia (Agricultural and Livestock Ministry)

MUCIA
Midwest Universities Consortium for International Activities

PMRN
Proyecto de Manejo de Recursos Naturales (Natural Resource Management Project)

ROCAP
Regional Office for Central America and Panama (USAID)

UNDP
United Nations Development Programme

USAID
United States Agency for International Development

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INTRODUCTION

In Central America and Panama, as in many areas of the world today, tree and forest resources provide an important energy source as well as a whole range of other goods and services used by the region's inhabitants. For energy use alone, fuelwood

provides more than half of the needs of the Central American region, from a low of 26% in Panama to a high of 64% in Honduras.

Fuelwood from natural forests meets about 60% of the total energy needs in Guatemala (Martinez, Bauer, and Jones 1983). In addition, trees provide many other benefits such as soil conservation, fruits, poles, rustic construction material, shade, and living fences. In many areas, such as the Guatemalan Peten and the communal forests of Totonicapan, Guatemala, tree and forest related production activities are the main source of off-farm employment (Veblen 1978).

There is increasing demand for agricultural land to provide food for the growing population and to cultivate export crops. This has encouraged colonization and conversion of large areas of forested land. This has created a serious deforestation problem in Central America and Panama, with a deforestation rate of about 416,000 ha/yr compared to a reforestation rate of less than 6% of the deforested area (Reiche 1993 [note 2]). The lack of sustainable natural resource management in Central America and Panama has resulted in high rates of soil erosion, deforestation, and declining productivity of soils (Leonard 1985).

A recent study of the fuelwood situation in El Salvador shows that the rate of fuelwood use in that country is greater than the estimated sustainable supply of fuelwood from its tree resources (Current and Juarez 1992). Researchers estimate that if the present rate of deforestation in Costa Rica continues unchecked, its commercial forests will be depleted before the turn of the century (Flores 1984, Matamoras 1987 cited by Quesada Mateo 1990).

Government efforts to meet the need for wood production through large plantations have not been sufficient. Often, they do not even approach meeting the current demand for forest products and are even less likely to meet future demands. In addition, government policies often worsen the problem by encouraging extensive ranching and plantations of export crops. These require clearing of forests to provide land for these often temporary ventures. Even if governments were to devote more effort to forestry promotion, they alone do not have enough resources, or experience, to affect the defores tation problem.

As an alternative to large scale government plantings and strictly controlled and protected forests, social forestry offers opportunities to increase significantly tree (one or a few on farm trees) and large forest resources and decrease deforestation.

In this paper, the term social forestry refers 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 (Gregersen, Draper, and Elz 1989: xi)."

This includes farmers growing wood to use or sell for firewood and people earning income from the gathering and sale of minor

forest products. Also included are landless people planting on public lands and governments or other groups planting trees on public lands specifically to meet local community needs. The major distinction between social forestry and other types of forestry such as production forestry is that the primary focus is on people and on community involvement with trees.

Social forestry can decrease deforestation by:

* productively managing natural forests for the benefit of local communities,

* providing an alternate source of tree and wood products, and

* increasing productivity of marginal lands through individual or community plantings, and

* generally improving the welfare of the rural poor.

By using strategies of tree cultivation and natural forest management developed through development projects or on their own, rural people have maintained forests and built up tree stocks. They often accomplished this more rapidly than if the public sector alone had been responsible for afforestation or natural forest management.

Past development projects have promoted agricultural and natural resources management activities that avoid environmental degradation and promote sustainable development. Sustainable development here means increases in production and/or changes in distribution of desired goods and services that result, for a given target population, in an increase in welfare sustained over time (Gregersen and Lundgren 1990). We stress that this definition includes the concept of production with environmental protection, not just sustaining natural resources and the environment alone.

The cumulative experience from these development projects provides a wealth of information that can guide present and future efforts to promote sustainable development. Much of this information exists only in the experience of extension agents, farmers, and other project participants and not in project evaluation documents. This paper accesses and condenses some of this information and experience. It makes the information available to planners, policymakers, trainers, extension agents, managers, and administrators to help them design and implement more sustainable projects, programs, and policies.

OBJECTIVES AND APPROACH

This study shows how sustainability issues relate to social forestry and the ways in which local projects or programs in

Central America have addressed them. We examined 11 project/program examples in five countries in detail (box 1 provides an overview of the examples). An annex, describing each study in considerable detail, is available from the EPAT/FWWM Team (see front cover for address).

Box 1. Case Studies in Central America for Sustainable Development

1. Sierra de Omoa Management Unit Agroforestry; Honduran Forest Corporation COHDEFOR World Food Program; Choloma, Honduras. Has successfully promoted an agroforestry system which established profitable tree crops on very steep slopes previously dedicated to shifting cultivation.

2. Natural Resource Management Project; USAID; Choluteca, Honduras. Has dealt primarily with soil conservation measures (including trees in terraced fields) in southern Honduras since 1984.

3. La Laguna El Jocotal Biological Reserve for Waterfowl; CENREN

National Park Service; Laguna El Jocotal, El Salvador. Has established artificial nesting boxes to revive a diminishing natural population of a duck once common to the reserve.

4. Community Nurseries; CENREN MAG Madelena; Santa Ana, El Salvador. Has promoted establishment of community nurseries in El Salvador, increasing the number from 1 in 1984 to 180 by 1988.

5. Agroforestry Support to Low Income Rural Communities; CENREN/FAO/UNDP; Cabanas, El Salvador. Has promoted soil conservation works and agroforestry systems, using agricultural inputs and loans as an incentive to plant trees.

6. Agroforestry Program; DIGEBOS CARE PEACE CORPS; Cabrican, Guatemala. Has promoted soil conservation and reforestation.

7. Communal Management of Natural Forest; Community of Paqui; Department of Totonicapan, Guatemala. Has promoted a traditional management system credited with preserving the natural forests of highland Guatemala in the Department of Totonicapan.

8. Private Natural Forest Management for Fuelwood Production; Sagastume Family; La Vina, San Pedro Ayampuc, Guatemala. Has provided a working model for the management of natural forests in less densely populated regions of the country.

9. Reforestation through Community Agricultural Centers; DGF Madelena CACH; Hojancha, Costa Rica. Has established a community agricultural center to provide technical assistance and training to support reforestation efforts of local landowners.

10. Homesteading and Land Ownership Laws; Government of Costa Rica; Costa Rica. A case study of factors contributing to deforestation in Costa Rica.

11. Traditional Forest Management; Kuna Yala Indians; Comarca Kuna Yala, Panama. A case study of the externalities caused by maintenance of large population concentrations on the islands off the coast of Panama.

These examples come from traditional resource management systems, development projects, and protected area management efforts in Central America and Panama. They represent private, communal, and government sponsored forestry activities. The information was gathered through interviews with participants in forestry activities, field personnel, project managers, policymakers, and the review of project documents and other relevant literature. I visited all of the forestry activities discussed except the natural forest management of the Kuna Yala Indians in Panama. People closely linked to the management provided information on those activities.

The discussion of these cases deals with project and policy-level factors that affect the sustainability of development efforts. Through these examples, it is possible to identify factors that, positively or negatively, influence the sustainability of forestry activities. Knowledge of these factors can help develop management guides, training materials, and training approaches addressing information needs of sustainable forestry development at project and policy levels.

It is important to understand that this review is not an attempt to evaluate the projects and activities with the specific objectives of each particular project. The aim is to identify those factors for each project that may have an impact on the sustainability of project objectives.

I have based the framework used for the analysis of the 11 examples upon one developed by Gregersen and Lundgren (1990) and Gregersen, Lundgren, and White (1993). I have adapted it to reflect the most important issues encountered in the review of relevant experiences in Central America. The following section discusses the framework.

FRAMEWORK FOR ANALYSIS

As mentioned, sustainable development goes beyond the concept of ecological or natural resources sustainability (such as, the forester's well tested concept of sustained yield forestry). Sustainable development, as used here, embraces the concept of improvement in human welfare over time. Depending on circumstances, welfare could be affected positively or negatively by either a drawdown or a buildup of forest capital, that is, a shift away from physical sustained yield.

Clearly there are many factors that affect the sustainability of benefits from forestry activities or projects and contribute to sustainable development. One obviously cannot look at all the various factors when assessing the sustainability of benefits from different types of projects. Thus, we need some logical framework to identify the major issues in sustainability and the primary factors, or categories of factors, to consider. This need and the work already done by the EPAT/FWWM Team at the University of Minnesota (Gregersen, Lundgren, and White 1993) formed the framework.

>From it, I have selected the following set of factors to assess the contributions to sustainable development of forestry and agroforestry projects in Central America and Panama:

1. Externalities produced by the project [note 3]. Some projects produce direct benefits that are sustainable within the project context. But they also produce positive and negative externalities or impacts that reduce the sustainability of development outside the project. These projects need to be watched closely if their net impacts are of concern.

2. Continuity after the project ends. An obvious and important aspect of sustainability of development is the continuity of the positive impacts of projects after their formal ending. Such continuity will depend, in turn, on how sensitive the project is to this need during its life. Particular factors to consider include the following:

* appropriate technical package with easily demonstrated benefits,

* adequacy and maintainability of required equipment,

* participation of local people,

* training of participants and promoters,

* continuity of project staff, and the buildup of sustainable institutions, and

* continuity of activities that require outside support.

3. Diffusion of positive results outside the project or program boundaries. Sustainable development in its broadest definition requires that the benefits of development not be isolated in a few communities. Thus, a key factor in the contribution of a forestry project to sustainable development is the extent to which benefits, such as ideas, technologies, and institutional innovations, have been or are being diffused beyond project boundaries.

4. Distribution of project costs and benefits among individuals within the project area. In addition to diffusion of positive results beyond the project geographical and time boundaries, we also have to be concerned with the distribution of the costs and benefits among different project stakeholders during the project.

As stated by the World Commission on Environment and Development, sustainable development involves consideration of changes in access to resources and in the distribution of costs and benefits (World Commission on Environment and Development 1987).

5. Uncertainty. One thing that is certain in life is the existence of uncertainty surrounding the results of human activities. Sustainability of benefits from development projects depends largely on how well the project has incorporated ways for dealing with uncertainty. These methods relate to the flexibility of projects to adjust to changes. For example, how good is the project's contingency planning concerning input use and cost and output uncertainties? Also, project success often depends on reducing the uncertainty surrounding certain aspects of a project. For example, project personnel may need to clarify tree and land tenure and make it more certain through government guarantees. The project may need guaranteed institutional support.

The following issues relate to uncertainty:

* flexibility of projects to adjust to change,

* flexibility in use of forest resources produced, and

* guaranteeing tree tenure.

6. Demand and supply. In assessing the sustainability of development activities, it is important to assess the potential of the resource base to produce a sustainable flow of goods and services to meet future needs. However, it is equally important to examine and carefully assess future demand for the goods and services produced. Attempts to produce abundant supplies of a good or service for which there is no market or demand can waste labor, capital, and natural resources that could be more useful elsewhere.

7. Institutional innovations. Development projects often introduce innovations in both governmental and nongovernmental institutions to facilitate project activities. Care in designing such institutional innovations ensures that any institutional changes will continue to be sustained and effective.

By defining and illustrating these impacts, this framework can be a tool to gauge sustainability better and ensure that future development efforts allow for these issues.

POLICY LESSONS FROM CENTRAL AMERICA

This section summarizes and synthesizes conclusions drawn from the 11 case studies regarding the seven sustainability factors

listed above. Table 1 summarizes the estimated impact of each factor on sustainability for the 11 cases. This assessment helps identify policy issues which require further attention. It will be important to explore mechanisms for presenting these issues to policymakers so they can begin policy changes to help promote, not impede, sustainable development.

Presented below are discussions of each sustainability factor and lessons learned about that factor from study of the 11 projects. (As mentioned, detailed analyses for the 11 cases are available from the EPAT/FWWM Team at the address listed on the front cover of this paper.)

Dealing with Externalities

Externalities are effects of an action (project or policy) that are outside the decision context or concern of those taking the action. These effects may be known but disregarded by the project planners or other authorities, or they may be unknown, unexpected, and unintended effects. It is evident that negative externalities can lead to problems of nonsustainability for:

* people outside the project area (spatial externalities),

* people living in some future period of time beyond the project life (temporal externalities), and

* sectors of the economy or individuals outside the context, or defined jurisdictional boundaries, of the project (Gregersen and Lundgren 1990: 10).

Two examples of externalities associated with the projects studied follow.

* Land ownership laws in Costa Rica tend to promote deforestation by offering settlers land titles if they clear previously unproductive land (forested land being considered unproductive) and put it into production.

* In the Direccion General de Bosques (General Directorate of Forests) - Cooperative for American Relief Everywhere (CARE) - Peace Corps project in Guatemala, a community was conscious of the problem of deforestation and wanted to avoid further deforestation in its own territory. Therefore it was bringing wood in from another community to provide fuel for lime producing kilns. This improved one situation but contributed to the deforestation of a neighboring community.

The first case of land ownership laws is the more common and troublesome one in Central America. Besides land ownership laws, government policies promoting extensive cattle ranching and other land uses requiring the removal of forest have contributed to deforestation in the region. These types of impacts represent policy issues that influence the sustainability of the forest

resource. Because of their impact, these issues need to be documented and reported to policymakers. National and international non governmental organizations (NGO) and research institutions are doing some of this type of research, but it is not clear whether they are reporting research results to policymakers. It is also unclear whether these results are having an impact on policy. We need efforts to ensure that researchers study impacts of policy and then present the results in a manner that can impact policy.

Population growth, which puts pressure on the limited amount of available arable land, will continue into the future. It is important to develop productive alternatives to agriculture. And researchers are now developing some innovative strategies for the productive use of natural forests. But, we need more research on strategies for developing ecotourism, gathering of medicinal plants, and use of other nontimber forest products. Then, to increase the productivity of forests and provide employment opportunities for communities in and around the forest, we need to implement and disseminate these strategies.

Table 1a. Sustainability Ratings of Selected Forestry Projects in Central America

Factor		Continuity	
Forestry Activity	Extern.	Approp. Tech.	Equip.
Sierra de Omoa Agroforestry Choloma, Honduras	+	++	+
Nat. Resource Mgmt. Project Choluteca, Honduras	+	+-	+
Laguna Jocotal Refuge San Miguel, El Salvador	+	+	+-
Community Nurseries Santa Ana, El Salvador	N.A.	++	++
Agroforestry Project Caba$as, El Salvador	N.A.	+	+
Agroforestry Program Cabrican, Guatemala	-	+	+
Community Mgmt. Nat. Forest Paqui, Guatemala	+	+	N.A.
Private Mgmt. Nat. Forest Guatemala, Guatemala	+	++	+
Reforestation Comm. Centers Hojancha, Costa Rica	++	++	+
Community Mgmt. Nat. Forest Panama	-	+	N.A.

Deforestation Homesteading Costa Rica	-	N.A.	N.A.	

Table 1a continued:

Factor Forestry Activity	Partic.	Continuity Train.	Staff	Supp.
Sierra de Omoa Agroforestry Choloma, Honduras	++	++	+	+-
Nat. Resource Mgmt. Project Choluteca, Honduras	+	+-	+-	+-
Laguna Jocotal Refuge San Miguel, El Salvador	++	+	+	+-
Community Nurseries Santa Ana, El Salvador	++	++	+	+-
Agroforestry Project Caba$as, El Salvador	++	+	++	++
Agroforestry Program Cabrican, Guatemala	++	+	++	++
Community Mgmt. Nat. Forest Paqui, Guatemala	++	+-	N.A.	+-
Private Mgmt. Nat. Forest Guatemala, Guatemala	N. A.	+	+	+-
Reforestation Comm. Centers Hojancha, Costa Rica	++	+	++	++
Community Mgmt. Nat. Forest Panama	++	N.A.	N.A.	+
Deforestation Homesteading Costa Rica	N.A.	N.A.	N.A.	N.A.

+ Factor with positive effect on sustainability.
++ Strong positive effect on sustainability.
+- This factor with both positive and negative aspects in relation to sustainability.
- Factor with negative effect on sustainability in project referred to.
N.A. Not applicable or information on that aspect of the activity not available.

Table 1b. Sustainability Ratings of Selected Forestry Projects in Central America

Factor	Uncertainty

Forestry Activity	Diff/proj.	Flexibility proj.	Flexibility prod.	Tree ten.
Sierra de Omoa Agroforestry Choloma, Honduras	+	+	+-	+
Nat. Resource Mgmt. Project Choluteca, Honduras	-	+-	+-	N.A.
Laguna Jocotal Refuge San Miguel, El Salvador	+	+-	+-	N.A.
Community Nurseries	++	++	++	N.A.
Santa Ana, El Salvador				
Agroforestry Project	+	+-	+-	N.A.
Caba$as, El Salvador				
Agroforestry Program	+	+-	+-	N.A.
Cabrican, Guatemala				
Community Mgmt. Nat. Forest	N.A.	++	N.A.	++
Paqui, Guatemala				
Private Mgmt. Nat. Forest Guatemala, Guatemala	+	N.A.	+-	-
Reforestation Comm. Centers Hojancha, Costa Rica	++	+	+-	+
Community Mgmt. Nat. Forest Panama	N.A.	N.A.	N.A.	N.A.
Deforestation Homesteading Costa Rica	N.A.	N.A.	N.A.	N.A.

Table 1b continued

Factor Forestry Activity	Distrib.	Deal. D/S	Deal. Inst.
Sierra de Omoa Agroforestry Choloma, Honduras	+-	N.A.	+
Nat. Resource Mgmt. Project Choluteca, Honduras	+	+	-
Laguna Jocotal Refuge	+-	+	-

San Miguel, El Salvador			
Community Nurseries Santa Ana, El Salvador	++	N.A.	-
Agroforestry Project Cabanas, El Salvador	+	+	+-
Agroforestry Program Cabrican, Guatemala	+-	N.A.	-
Community Mgmt. Nat. Forest Paqui, Guatemala	++	N.A.	+-
Private Mgmt. Nat. Forest Guatemala, Guatemala	N.A.	N.A.	+-
Reforestation Comm. Centers Hojancha, Costa Rica	+	N.A.	+
Community Mgmt. Nat. Forest Panama	N.A.	N.A.	+
Deforestation Homesteading Costa Rica	-	N.A.	N.A.

+ Factor with positive effect on sustainability.
++ Strong positive effect on sustainability.
+- This factor with both positive and negative aspects in relation to sustainability.
- Factor with negative effect on sustainability in project referred to.
N.A. Not applicable or information on that aspect of the activity not available.

The second case of one community bringing in fuel wood from a neighboring area illustrates the impact any project may have outside its designated area. When developing a project or forestry activity, planners and implementors must not lose sight of, or fail to consider, its positive and negative effects outside the immediate project area.

Other cases in Guatemala showed positive externalities. They came from the communal and private management preservation of natural forests in the highlands and near the capital city. At the same time, people deforested surrounding areas. Besides considering the possible negative externalities of forestry activities, we must take the positive externalities into account.

We must find ways to present positive externalities in the overall evaluation of forestry activities and to promote them in future projects.

Dealing with Continuity After the Project Ends

Continuity is an important and complex factor to consider in looking at the impact of any forestry activity. Most projects, programs, or policies are meant to introduce activities or attitudinal changes that will continue into the future. The six issues discussed below may function individually or in various combinations to influence continuity of forestry activities. We need to consider them as interacting elements in sustainability evaluation.

Continuity Issue 1 - Appropriate Technical Package with Evident Benefits

Tree planting projects that either quickly produce or easily show benefits to the participants have greater success. Thus, they have a better chance of continuing than projects that provide benefits that are less apparent or take a long time. Good examples are soil conservation projects that promote physical barriers that require much hard work and are slow to show benefits. On the other hand, some tree planting projects were producing benefits within two to three years.

In most projects, there are early adopters who participate out of faith that the project will provide benefits equal to their efforts. As projects begin to produce obvious benefits and the community notices them, participation increases very quickly. When tree planting projects begin, an almost universal reason for not planting is that farmers believe they will not benefit from their own efforts. The quick growth and straight stem of Eucalyptus usually surprises farmers. Within two to three years trees are 5 to 10 meters high and producing fuelwood and poles. This has proven to be a strong incentive for others to also plant trees.

However, the effect of fast growing trees doesn't last long unless farmers have an outlet for the wood or other tree products. To ensure this outlet, marketing studies and efforts need to accompany development of technical packages. In addition, the farmers must believe that the benefits justify their investment in time, inputs, and money.

The shortage of wood products alone does not guarantee a market. Tree planting projects must use trees that will generate products demanded by the market. Eucalyptus in El Salvador found a market almost immediately. With Gmelina in Costa Rica, farmers expected income from the thinning out of smaller trees, but the major market for trees is for sawtimber. The trees thinned out are not big enough for that market.

The technical package used for dissemination is important to success and continuity. Technical packages should be simple, culturally acceptable, and not require any specialized equipment.

Proven and properly applied technology is the most important consideration. Proper application depends on having qualified

technical assistance and adequate training of both extension staff and project participants.

The community nurseries in El Salvador provide a good example of the potential of a proper technical package combined with training. It is not as easy to grow "Eucalyptus" in nurseries as it is other species. But the nurseries have produced the seedlings through a high level of technical assistance and proper training. The nurseries then pass this technology on to the project participants. Farmers now are producing plants in their own nurseries. We can contrast this success with the Proyecto de Manejo de Recursos Naturales (PMRN) project in Honduras. The PMRN project originally started producing Eucalyptus in project nurseries managed by agronomists. But they decided to stop producing them because of technical problems from inexperience or lack of training in tree nursery practices appropriate for Eucalyptus.

Continuity Issue 2 - Adequacy and Maintenance of Equipment

The equipment required by the technical package must be readily available to the farmers or communities. Basic equipment needs for nurseries are the same as farmers require for their agricultural crops. Development of private nurseries in El Salvador obviously shows that equipment required for the nursery technology promoted is available to the participants.

Although the examples used here did not mention equipment, this is an important issue to consider. When providing technical assistance, a donor agency should be sure that the counterpart agency has the technical and financial ability to operate and maintain the equipment provided.

In the shop area of the Corporacion Hondureno de Desarrollo Forestal (COHDEFOR), Honduran Forestry Development Corporation, there is a large assortment of heavy road building machinery in various stages of repair, much of which has been sitting there for a year or longer. The planning officer commented that past projects had already given them enough equipment that they could not maintain. He was not interested in increasing the collection. On a related issue, he also said that they did not want large projects coming in and setting up an infrastructure and organization with supporting personnel that the local group could not absorb.

Another equipment problem stems from a practice of many donor agencies that requires that the project purchase equipment or vehicles from their country. Often the project country has an abundant supply of other makes of vehicles with supply parts and qualified mechanics.

Bringing in less well known vehicles has created servicing problems for three reasons:

* The vehicles are often imported instead of purchased from agencies within the project country. Because the project did not

purchase the vehicle from a local agency, it is reluctant to provide service.

* Replacement parts are often difficult or impossible to find. Project personnel must then order from the country of origin of the vehicle, causing delays in repairs and maintenance.

* Mechanics are not familiar with the vehicles.

One mechanism that can cope with this problem occurs at Centro Agronomico Tropical de Investigacion y Ensenanza (CATIE), a Central American institution serving as the base for several development projects. Their project personnel frequently travel within and outside the region. Taking advantage of this, project personnel who need replacement parts often request that CATIE staff bring back parts when they travel. However, this method is temporary and does not offer a long-term or sustainable solution.

Instead, projects should provide or use locally known and serviceable equipment.

Continuity Issue 3 - Participation of the Local Population

In the cases reviewed here, participation of the local population has been an important factor for success and continuity. But even more important is that participants feel that they are the owners of the project or the trees established through it. Extension agents repeatedly mentioned this factor, especially when discussing projects using food for work and payments to participants as wages rather than as incentives.

Although the difference is subtle, it is an important one. When people receive wages or food for working on communal lands, their only motivation is the wage or the food ration. This is most important when participants perceive the work primarily as a job.

They consider those paying them as the owners of the end product, whether it is a plantation or terrace. They expect a continuous flow of food or wages if the owners want them to maintain the soil conservation works or tree plantings.

By contrast, in community nurseries in El Salvador and the Agroforestry System in the Sierra de Omoa in Honduras, food for work was kept to a minimum with the understanding it was to help participants engaged in tree planting activities. The ultimate goal was the generation of benefits from the trees for their own use. Participants planted the trees where they wanted on their own land, harvested them, and received the benefits. They felt they were the owners of the trees and went to great lengths to protect them. One of the greatest threats to recently planted trees are sompopos, large ants that defoliate the trees. Many farmers have spent nights guarding their trees from the leaf cutting ants by following the ants to the nests and using pesticides. Obviously, farmers feel they own the trees and want to protect their investment of time and effort in producing and planting the trees.

Another area of participation that helps guarantee project continuity is the involvement of local leaders in helping promote and carry out the projects. For example, the Laguna El Jocotal in El Salvador hired members of the local community as forest guards. These employment opportunities also benefit the community. If project personnel choose promoters well (as with the Direccion General de Bosques (DIGEBOS) General Directorate of Forests - CARE - Peace Corps program in Guatemala), they are people who have proven their leadership and dependability and have the confidence of the community. This increases acceptance of a project and provides a liaison person who can organize activities and backstop for project personnel. It also helps the community feel that it is participating and has a greater role in the project.

Continuity Issue 4 - Training of Participants and Promoters

Training is obviously a basic and important factor in guaranteeing continuity of forestry activities. If the technical capacity does not exist to continue activities when skilled project personnel move on to other projects, there can be no sustainability or continuity. This applies as much to training project participants as it does to training host country counterparts to take over activities of experts brought in at the beginning of projects. Sometimes, this may be a long process. Projects should guarantee that experts will be available while local counterparts are in training in-country or overseas. Also the local person being trained to take the expert's place must have a guaranteed position that takes advantage of that training on returning.

The community nurseries in El Salvador provide an excellent example of continuity of forestry activities through training. Through the hands on training provided by working in the community nursery, one participant has completed the cycle of activities required to get trees planted. He now knows how to:

* plant trees he produced in a community nursery,

* gather seed from the same trees, and,

* with the help of his family, produce seedlings for sale in his own nursery.

The training has transferred the technical capacity to produce and plant seedlings to the local population. If the project were to end tomorrow, that community could continue to produce and plant seedlings.

Another innovation in training, used in the Sierra de Omoa agroforestry program, is the use of farmers to train other farmers. When the need to make charcoal for sale arose, the program hired farmers from an area outside the project area. They had experience in charcoal production and were able to train project farmers. Although the technology could have been more

efficient, it provided a convenient way to meet a training need. It is also probable that when farmers train other farmers, they are more likely to understand the needs and resources of their audience and communicate better with them.

Never underestimate the importance of farmer to farmer contact, whether through demonstration plots or training. Perdomo (1989) says that it was not until farmers from the Department of Cabanas, El Salvador, could to talk to project participants in Chalatenango, that they believed the project would deliver the technical assistance it promised. Besides the obvious benefits of better understanding of the needs of others and trusting each other, it shows farmers that they are considered capable practitioners.

Continuity Issue 5 - Continuity of Project Staff

Although a project does not have to use the same staff for it to continue, that can be the deciding factor on whether project activities become established well enough during implementation to continue after the project ends. The Proyecto de Manejo de Recursos Naturales (PMRN) in Honduras provides a good example. With the change of government two years into the project, political reasons forced replacement of project personnel, including extensionists. This interrupted project activities and eliminated the benefits of two years of training. This may require training new extension agents, not interested in project activities, possibly causing participants to lose confidence and interest.

The politicization of forestry activities has other side effects.

One of the project personnel from the DIGEBOS-CARE Peace Corps Program in Guatemala gave this example. As the project became more politicized, he often was called away to attend a visiting government official although he had already set up a meeting with farmers. Because leaders had political priorities, they ignored commitments to project participants. Thus project participants will probably respond similarly and ignore project activities.

Finally, an important issue is the continuity of trained personnel from counterpart agencies in similar activities. Government agencies often cannot absorb these people and do not continue employing them. They shuttle them off to an area of the institution in which their training has no application or transfer them to a new project with funding. In this way, resources necessary for continued support to activities started by a project are lost or underused. This issue receives much attention but often remains unresolved.

Continuity Issue 6 - Continuity of Activities that Require Outside and Long term Support

In most forestry development efforts some activities require outside support. One of these is the development of technology

to improve the benefits from tree planting. The success of reforestation efforts in Hojancha, Costa Rica, would not have been possible without research and technology development. This occurred with local testing and adaptations through the Lena and Madelena projects at CATIE. Community nurseries in El Salvador also benefitted from tested nursery and tree planting technologies. The lack of that technology was part of the reason for the failure to produce Eucalyptus seedlings in the PMRN Project in Honduras.

Research can improve the results of forestry activities through improved genetic stock, more appropriate matching of species to socioeconomic and site conditions, and marketing of tree products. We need mechanisms to:

* provide for research in improved forestry technologies, and

* make research information available to people who need to use it.

The difference between the growth of a tree of good genetic stock and well adapted to a site compared with one of poor genetic stock and poorly adapted may be the difference between its life and death.

It may also be the difference between acceptable growth versus poor growth, and the success or failure of sustainable forestry activities. If research capacity to generate technological improvements and respond to field problems is not available, the possibility for sustainable forestry development declines.

Research, especially when dealing with trees, requires long term commitments of funding and per sonnel to guarantee that experiments can be completed and results published. This type of research is not well adapted to the typical five year project life nor a priority for national forestry institutions. Although many projects are renewed and extended, extensions are uncertain until the last minute (month). This often results in the loss of trained scientists in search of more stable positions, loss of continuity, and often the suspension of measurements of research plots.

The question of continuation of outside support raises the issue of dependency on that outside support. In the same way that farmers or laborers become dependent upon food for work to establish and maintain forestry activities, governments and national forestry agencies can become dependent upon outside support to keep operating. In some cases, such as research, this may be necessary. But in other cases, these institutions must develop the institutional capacity to continue on their own the forestry activities initiated through outside support.

Diffusion of Positive Results Outside the Project or Program Boundaries

Probably the greatest test of the sustainability of a forestry

development activity is its diffusion outside the original working area. This may occur:

* when communities outside the area adopt the activity based upon observation and discussion of project results, as with community nurseries and, reportedly, the agroforestry system in Sierra de Omoa, Honduras, or

* by developing a special project activity for diffusion of an activity as with the Centro de Recursos Naturales, El Salvador (CENREN) - Food and Agricultural Organation (FAO) - United Nations Development Programme (UNDP) project in El Salvador.

In all cases where forestry activities have been adopted in communities outside the original target area, the demonstration effect has been important. This can occur either deliberately or through neighboring communities copying the activities. Seeing the results and benefits received by their neighbors convinces people to adopt the activity. If a project or forestry activity cannot attain that effect, probably it does not produce good enough results to cause people to adopt it. Then, project personnel must question the sustainability of the activity.

Distribution of Costs and Benefits among Individuals

The question of who benefits from a development activity in a community is always an important issue. Most projects try to target the poorer members of a community to improve their welfare. However, those people may not be those most interested in trying out new activities. In the projects reviewed, there were a variety of situations regarding distribution of project benefits.

In traditional communal forest management in Paqui, Totonicapan, Guatemala, the forest area belonged to the whole community. Based on need, leaders distributed it fairly to community members for fuelwood or home construction. The organization of this community could serve as a model for other communal efforts with the understanding that, for social and cultural reasons, the success of Paqui may be difficult to duplicate.

The case of Hojancha, Costa Rica, shows how a community of small landowners arranged to receive incentives in the form of direct payments for tree planting. Formerly, only richer landowners benefitted from fiscal incentives. This action helped achieve a fairer distribution of benefits from national incentive legislation by including smaller landowners. They had been restricted from taking advantage of fiscal incentives since they do not pay taxes. Through the support of local legislators and officials of the forestry department, legislation was proposed and approved which provided funds for financing tree plantings by small and medium sized landholders.

The community nurseries in El Salvador provided an opportunity

for land owners or land reform recipients to plant trees on their land. By contributing family labor to produce trees in a community nursery, people could receive free tree seedlings to plant on their property.

But as in most projects, although landowners were able to get project trees, landless farmers did not have opportunities to plant and benefit from tree plantings. The Sierra de Omoa agroforestry project limited participation to farmers with enough land to produce subsistence crops while they were establishing their cacao plantations. Smaller landowners also could get trees to plant.

Field extensionists of the CENREN - FAO - UNDP agroforestry project in El Salvador brought up the important issue of the distribution of benefits. Projects such as theirs often set tree planting goals in quantity of land planted to trees or covered by soil conservation activities. This emphasis on area often pushes field people toward larger landowners to meet their planting goals. It biases extension efforts at the expense of smaller landowners. Fixing goals based upon the number of farmers adopting tree planting or a combination of area and numbers of farmers could solve this problem.

Whatever the solution, we need to achieve a more equitable distribution of project and program benefits. To guarantee participation and sustainability, it is also important to involve intended beneficiaries and local promoters in goal setting.

Dealing With Uncertainty

Any project has uncertainty and risk. Changes in project goals or themes can occur without notice. Markets disappear for certain products while new markets appear for others. Natural disasters can damage project works and morale. The list is endless.

To deal with uncertainty, forestry activities must have the flexibility to adjust to unexpected changes in market, sociocultural, and technological environments. Ways of dealing with uncertainty include:

* providing the flexibility to change project design to adapt to uncertain field conditions,

* producing a product that has multiple uses, and

* removing the uncertainty of tree tenure that exists from government regulations affecting the ownership and harvesting of trees.

Uncertainty Issue 1 - Flexibility of Projects to Adjust to Change

Most projects have a project paper showing a plan for the life of the project based upon the information available at the time it was designed. This information could be plentiful for a follow up project or minimal for a new project. Despite the original situation, changing conditions may make the original plan unfeasible or at least require adjustments. Projects must have the flexibility to make those changes, adjusting the activities to prevailing conditions and helping guarantee sustainability.

Of the cases reviewed, projects of a spontaneous nature (Sierra de Omoa agroforestry, community nurseries in El Salvador) were the most flexible. Because people developed them locally through a trial and error process, it was necessary to adjust activities to prevailing conditions. This kept them flexible. The Sierra de Omoa agroforestry system started with Gliricidia, a commonly planted nitrogen fixing tree that is native to Central America and planted as permanent shade in coffee and cacao plantations. The agroforestry system also used Theobroma cacao, the tree crop that produces cocoa. Later, people added food crops under the trees to supplement wood and cacao production.

When financing the costs of the cacao plantings became a problem, project leaders met the need with sales of fuelwood and charcoal.

In community nurseries, when having a problem germinating Eucalyptus, they germinated seedlings in central nurseries and sent them to community nurseries for transplanting.

In community nurseries, the Lena-Madelena projects, although basically research, had the flexibility to offer technical assistance and supplies for the nurseries. Without this flexibility, the projects and programs could not have produced positive results. In contrast, projects without this flexibility, because of dogmatic adherence to planning documents, are less likely to develop sustainable activities and alternatives for the farmer.

Uncertainty Issue 2 - Flexibility in Utilization of Forest Resources Produced

Products coming from tree plantings must be able to supply the needs of their owners or, when grown for sale, provide options for profitable marketing. Producing a single product for a single market makes tree growers too dependent on that market. Because of the scarcity of wood and tree products in Central America and Panama, it seems that most wood will find a market. However, that has not always been the case. Therefore, projects and programs should provide tree species or a combination of tree species that can produce a variety of end products.

The CENREN - FAO - UNDP agroforestry project in El Salvador emphasized tree growing because of a company in El Salvador that is purchasing teak. As a result, many plantings there are producing teak for that market. If the teak market were to disappear, there might still be an outlet for the wood. However, it might not be as profitable as originally promoted.

In the community nursery project in El Salvador, when the trees reached a usable size, planters quickly determined the best possible uses for the tree products. One participant explained that the Eucalyptus he was growing was no good in the earth or close to the ground but excellent for house construction in the air, that is, those parts of the house elevated above the ground.

In addition, his community was cooperating with another project that was exploring alternate uses for Eucalyptus. Much of the interest occurred from personal initiative. We can learn much from the practical experience of these tree growers and should not ignore this information. Their use of tree products and the value received from those products will determine whether they continue to plant a certain tree species. Ultimately, it will help determine the sustainability of those tree planting activities.

Uncertainty Issue 3 - Guaranteeing Tree Tenure

When visiting projects and tree planting programs throughout Central America, one recurring issue relates to sustainability. It is difficult to assure farmers that if they plant trees, they will have permission to harvest them in the future. They also want assurance that their land will not revert to the government if they benefit from a government-sponsored program while planting. These concerns are common worldwide. Obviously, from the examples presented here, projects and programs have overcome this limitation through special arrangements. However, in areas without this arrangement, laws always remain as a deterrent to tree planting efforts.

The example of the Natural Forest Management of the Sagustame family of Guatemala shows an extension of this problem. Although there are now incentives for reforestation, there are none for productive management of natural forests. As a result, farmers in many Central American countries have destroyed natural forests to start plantations so they can benefit from government incentives and tenure security.

Changes in this area of government policy could greatly benefit reforestation. When governments recognize natural regrowth as reforestation, they provide a positive example of policy changes.

These changes can encourage management of natural forest areas rather than their destruction.

Bureaucratic procedures and regulations governing the harvesting of trees are a major cause of uncertainty in tree growing in Central America and Panama. Often, tree planters have no guarantee that they can harvest them. Or if they can harvest, the time and expenses involved in getting a permit make harvesting unprofitable or unattractive.

Projects and programs have gotten around this problem by working out agreements with government agencies as in Honduras (Sierra de

Omoa) or by developing an approved management plan for the entire project as in Guatemala (DIGEBOS - CARE - Peace Corps). These types of arrangements solve the problem for individual projects or programs but avoid the issue for more widespread tree planting activities. There is a need to make policy changes to remove this obstacle to tree planting and for projects to consider this problem in project development.

Dealing with Both the Demand and Supply Side of Development

The projects reviewed in Central America and Panama dealt primarily with tree planting and management or the supply side of forest resources. The Natural Resource Management project in Honduras and the CENREN - FAO - UNDP project in El Salvador introduced more efficient cook stoves with some success. By reducing the amount of fuelwood needed to cook a meal, these cook stoves effectively lower the demand for fuelwood. This is an area where projects could concentrate more effort.

Removing the demand for low value products, such as fuelwood, frees up trees for other more valuable products. This effectively increases the value of the forest resource and makes forest or tree management more profitable and, therefore, more sustainable. Farmers who have planted "Eucalyptus" for fuelwood often refuse to cut it for fuelwood because they can envision a higher value end product coming from the trees (in their words a more "noble" use).

At another level, many natural forest preservation schemes now include a productive component that provides an alternate source of income or sustenance for local people. This lowers the demand for plots for cultivation of agricultural crops. Formerly, those plots would have been cut out of the disappearing natural forest.

This kind of development effectively lowers the demand for agricultural lands and improves the chances of sustaining natural forest areas.

Dealing with Institutional Issues

Almost all forestry activities must eventually deal with some sort of bureaucracy, either governmental or nongovernmental. The extent to which projects or programs can effectively deal with those bureaucracies helps determine their sustainability. In the cases presented here, two projects faced increased bureaucratic control of their activities. They were the DIGEBOS - CARE - Peace Corps agroforestry program in Guatemala and the CENREN - MAG - Madelena community nurseries program in El Salvador. In both cases, increasing bureaucratic control put limits on their activities but did not stop their progress.

In other cases mentioned previously, project personnel found ways to cope with requirements for permits for harvesting trees. However, as communities take on responsibility for project activities, the need to deal with institutional issues will diminish for certain activities. Often the problems have arisen because the extension agency provided the supplies of inputs needed by the communities (for example, plastic bags and fertilizer for nurseries). As communities become more independent, they are able to obtain these materials independently. Then they need less help from institutions, limited to technical assistance. The extent to which communities become independent of government bureaucracies also can be an indicator of the sustainability of the introduced activity.

In Centro Agricola Cantonal de Hojancha (CACH) in Costa Rica, an important aspect of sustainability was the community's access to the political system. It was able to get incentive payments channeled to small farmers as well as large landowners. This is not always possible. But when project participants have access to the political system, there is a better chance to make policy changes to benefit forestry activities.

CONCLUSIONS AND RECOMMENDATIONS

We examined 11 forestry development projects in five Central American countries for their potential to produce sustainable benefits. We used a framework of seven factors that influence sustainability of project results: externalities, continuity, diffusion, distribution, uncertainty, demand and supply, and institutional innovations. Comparisons of the development projects provides some lessons for future projects. These lessons should be helpful in avoiding unsustainable development alternatives in future forestry development programs. Table 2 (at end of text) summarizes lessons learned from these comparisons.

In addition to specific lessons learned, it is possible to draw some more general conclusions about policies that support forestry development. These conclusions apply to the public sector, international donors, and national and international development banks. National governments need to consider how international donors and lenders can best fit into national plans and help meet the priority objectives of both types of institutions.

Following are the major conclusions and recommendations for project and policy development.

Projects and development programs should be compatible with national development interests and the most efficient use of national and external resources. In the past, many projects sponsored by international donors or development banks have

responded to interests and objectives of the international donor or lender. Countries have accepted projects without considering the interest or capacity for their governments and institutions to provide follow up support to those efforts. To improve this situation, international organizations need to coordinate with national governments. Projects should contribute to development activities that are compatible with national interests and capacities.

Externally financed development activities should have the support of national governments and institutions to provide continuity. National governments need to have the capacity to provide that continuity.

Development projects and programs should focus more on developing local capacity and local participation in development efforts. The projects reviewed show the value of using local promoters, hiring local residents for development efforts, relying on farmer to farmer training, and using local institutions. They also show the problems caused by government bureaucracies that create obstacles to flexible management of development efforts. These results suggest that we need more efforts to train local farmers to promote and implement the improved management of forest resources. We also need to keep government support to a minimum.

These efforts should make local communities self sufficient in terms of resources and minimize costs of government involvement to insure both continuity and diffusion of project benefits.

Project activities should have a longer term focus. Projects often have relatively short lives. Experience shows that when projects do extend it is not necessarily a smooth transition. The short term focus of many projects has led to short term "successes," not sustainable over time (past the formal termination date of a project). This is especially true of forestry activities requiring more time to mature and demonstrate benefits that will convince participants to adopt them. We need donors, lenders, and national governments and institutions to develop long term strategies to guarantee the long term support necessary for sustainable development. This may require making projects into components of longer term strategies. Or it may mean phasing projects better to provide the technical and economic inputs at appropriate times in the evaluation of forestry activities.

Legislative support is important for sustainable forestry development. Existing forest policies often omit natural forest management as an activity eligible for incentives. At the same time, permits to cut and transport trees act as disincentives to tree planting and the management of natural and planted tree resources. There is an example in Costa Rica of new legislation that provides incentives for natural forest management and eliminates the problem of permits for harvesting planted trees. We need to do more to eliminate these barriers to forest management and reforestation in a way that also maintains protection of natural forest resources. This could contribute greatly to the promotion of sustainable forestry development.

We should give more consideration to potential positive and negative externalities in the present and future. Forestry development can produce positive and negative externalities that we need to consider in any forestry development program. One area where policy can contribute to sustainable forestry development is in the analysis of positive externalities produced by sustainable forestry activities.

We need to seek more equitable distribution of forestry development costs and benefits. As the case in Costa Rica shows, many countries in the past have provided incentives for large scale forestry development through larger landowners and businesses. But smaller landowners have shown that they can establish and manage forestry plantings often with better results. We need to recognize this potential in incentive programs. Widespread, small scale forestry development can promote sustainable and more equitable forestry development. This can, in turn, support local community development through higher incomes and employment.

Table 2. Lessons Learned about Sustainable Development from Forestry Development Projects in Central America

Sustainability Factor

* Lessons Learned

Externalities

* We must analyze forestry activities to see if they are producing negative externalities. If so, projects need to take corrective actions. Similarly, if projects are producing positive externalities, projects should use that data to expand the same or similar forestry activities.

Continuity - Appropriate Technology

* Activities promoted should use proven technology. The testing should be empirical testing through application under field conditions.

* Technologies should be simple. If they are complex, there should be proper training for responsible personnel.

* Promoted activities should produce short term benefits as incentives and demonstrations for the community. For trees, experience shows that farmers consider benefits within 3 to 6 years as relatively rapid. They usually expect to wait much longer for trees to produce. Also, the initial quick visible growth of trees, though they are not producing tangible benefits, is a key factor in encouraging participation.

Continuity - Equipment Adequacy and Maintenance

* Replacement parts, technical manuals, and experienced

technicians should be readily available to service equipment, vehicles, and other machinery.

* Whenever possible, project personnel should buy all equipment locally.

* Technologies promoted should require equipment that is readily available locally at a reasonable price or already owned by participants.

Continuity - Local Participation

* Use local, trained promoters to hire local community members to provide support for activities.

* Forestry activities promoted should meet expressed and perceived needs of the communities.

* Select local promoters and technicians with great care. Trusted and respected persons should take precedence over those with technical skills. It is important to hire local technicians when possible because of their knowledge and acceptance by the community and the greater stability they represent. Community technicians will generally be less likely to leave their jobs to work in other areas of the country.

* Include participants in decisionmaking about proposed project activities.

* Require participants to invest their own resources in project activities, whether labor, money, or other inputs. They must feel that they own the trees or other outputs.

* Transfer responsibility for the management and maintenance of promoted activities to participants as soon as feasible. They should not become dependent on the project, nor should project personnel depend on them for a job.

Sustainability Factor

* Lessons Learned

Continuity - Participant Training

* Use farmers to train other farmers through visits to demonstration farms or more formalized training. This is one of the more effective training techniques. Adequate technical backstopping by extension agents and specialized technical assistance should complement this training by farmers.

* Participant training is essential to guarantee continuity and should be an integral part of any project.

Continuity - of Project Staff

* Mechanisms should guarantee continuity of project staff. Agreements between donor agencies and the government agency

providing personnel can often accomplish this. Monitor these agreements to ensure follow through.

* Provide incentives to encourage project staff to stay with projects. Institutionalize these incentives so that counterpart agencies can carry them on once projects have formally terminated.

Continuity - Activities Supported by Outside Means

* Continue support to maintain the flow of benefits through government agencies or local organizations after formal project activities have ended.

* Guarantee uninterrupted support to research activities at least until the termination of a productive cycle (rotation). For trees this can easily approach 15 to 20 years or more.

* Three to five year projects should have mechanisms built in for smooth and uninterrupted transition or extension, unless personnel believe it is inappropriate after the initial implementation period. Three years is usually too short for a project to show extension results. Many projects have mechanisms for continuation after the initial implementation period, but the transition is not usually smooth resulting in an interruption of project services to participants.

* Integrate forestry extension with existing extension. This allows the forestry activity to benefit from working relationships already established with farmers whether through NGOs or government extension agencies.

Diffusion

* The demonstration effect and farmer to farmer contact are the most effective mechanisms for spreading the impact of positive project activities outside of project boundaries.

Distribution of Costs and Benefits

* Use a high degree of organization to manage community management activities successfully. This includes a well defined system for distributing benefits.

* Outplant trees on private plots for community nurseries to work best.

* Include mechanisms in projects to allow for the participation of small and medium sized landowners.

Sustainability Factor

* Lessons Learned

Uncertainty - Flexibility in Projects to Adjust to Change

* Project planning documents need to be flexible so changes in

planned activities can adjust to needs encountered during implementation.

* Provide mechanisms to receive the input from field personnel and project participants. This input is important to evaluate project activities and make changes when necessary.

Flexibility - In Using Project Outputs

* Make sure that species planted have a ready market, not a specialty market, for their products upon maturity.

* Marketing should be an integral part of project activities to ensure an outlet for proceeds from the trees.

* Select species that best fulfill the needs of project participants and can provide multiple outputs.

Flexibility - Guarantee of Tree Tenure

* Guarantee program and project participants that they will receive permission, with a minimum of bureaucratic complication, to harvest trees.

* Promote legislation to help guarantee that all persons planting trees will have the right to harvest them.

Demand and Supply

* Explicitly address problems of demand for forest products. This includes producing products to meet existing demand. It also includes lowering the demand for products like fuelwood and demand for conversion of forestry to agricultural land.

Institutional Innovation

* Bureaucratic complications can delay acquiring supplies or hinder tree harvesting. These complications can endanger project sustainability.

* Build mechanisms for overcoming this problem into project implementation procedures.

* Streamline institutional procedures for requesting and receiving supplies to help guarantee timely delivery.

ENDNOTES

1. The Tropical Agricultural Research and Training Center, Turrialba, Costa Rica. This is an international center that provides graduate training and undertakes research in a wide variety of natural resources related fields.

2. Reiche was citing the Tropical Forestry Action Plan country studies for Central America.

3. Externalities is an economic term which refers to effects or impacts of a project on others outside the project. These effects do not affect the project itself (at least not directly in terms of the decisions made by those who are undertaking the project) and are external to its decisions. For example, downstream pollution from a pulp and paper mill is an example of a negative externality. Increased honey production on a neighbor's land from planting of fruit trees (and thus increased pollen supply) on your land is an example of a positive externality.

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