Harvests from rainforestation: economic and cultural aspects of environmental farming

PACIENCIA P. MILAN[1], JOSEF MARGRAF[2] AND MARLITO JOSE M. BANDE[1]
[1]ViSCA-GTZ Applied Tropical Ecology Program, ViSCA, Baybay, Leyte, Philippines
[2]GTZ Project Office, Xishuangbanna Nature's Reserve, North Ga Lan Road No. 6, Jinghong City 666100, Xishuangbanna, Yunnan, China

Abstract

Producing short term benefits from long term investments in environmentally sound forest farming systems is repeatedly called for by farmers and economists. The viability of a new technology is usually measured and judged in terms of economic efficiency. This implies that scarce resources should be used to maximize the benefits from them net of the costs of using them. This principle is enshrined in cost and benefit analysis which is widely used decision tool. However, traditional cost and benefit analysis covers only those items that have monetary values, e.g., those that are marketed and are easily quantified. The environmental impacts of the technology are oftentimes neglected. For example, the benefits of a functional ecosystem are often undervalued or not being considered at all. The problem with valuing these benefits is that many of them have a zero price because no market place exists in which their rule values can be revealed through the act of buying and selling. They are therefore provided free. The paper presents some limitations of conventional economy and highlights aspects of rainforestation at the early development. It also explains why farmers are adopting a technology even though conventional economists are not yet seeing the benefits for the farmer and his/her environment.

Introduction

Forests play a key role in the lives of thousands of people in the Philippines, particularly those living in the uplands and those whose resource-base is the upland forests. Yet the economic and ecological functions of our forests are underestimated due to lack of understanding of the interplay between the potential of improving farmers' income and the

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ecological as well as the cultural functions of the biodiversity of the forest. Most economic valuation of the forest ecosystem and its components excludes the nonmonetary importance of the ecosystem. The difficulty and the complexity of a standard valuation of the intangible benefits and products of a dynamic ecosystem such as the forest has caused quite a dilemma when one ne has to assess the benefits of a new technology or a paradigm shift from the conventional input-output relationships of resource in and money out to an environmentally sound forest management which requires long term investments. Sustainability in forest management traditionally translates only good timber yield but modern definitions of forest sustainability also include ecological, socioeconomic and cultural considerations (Prabhu et al., 1993). Increasing human pressure in the forests had brought about loss in biodiversity, reduction in species richness, climatic changes, disruption in nutrient flow, and destabilization of forest structures among others. How we balance the need for wood and income for most of our marginalized farmers and the greed of unscrupulous loggers and the conservation of our biodiversity and the ecological function of our forest depends on the monetary value and the cultural tag we give to this ecosystem in peril. Likewise, the conversion of forest areas to other forms of land use especially plantations of exotic fast-growing species and agriculture has threatened the sustainability of our natural forests.

The rainforestation farming concept

It cannot be overlooked that the forest resources are disappearing at an alarming rate (Schade et al., 1988) due to human pressure and the complacency of concerned agencies who are tasked to safeguard the integrity of our forests. At the same time, it can also be said that most of our reforestation efforts failed to reach targeted goals or fall short of expectations, hence the pathetic scenario of our uplands and the associated ill effects of deforestation. For example, forest loss in Leyte due to conversion of forest lands into agricultural areas for production portrays the vulnerability of the forest ecosystem to the productionist goals of upland households and of the society as a whole (Dargantes, 1996). This holds true globally, and therefore, calls for a critical examination and understanding of natural and agroecosystems in order to discover elements of sustainability in traditional farming systems and to find innovative options to farming in upland areas without necessarily disrupting its ecosystem function. Our Philippine forests continue to decline despite of measures taken to curtail their destruction. Farmers continue to cut down trees to give way for more agricultural lands and for economic reasons foremost. Logging, although relatively reduced due to inaccessibility of timber stands, continue to proliferate when power and guns speak louder than laws. Such is the grim scenario in Leyte and other islands in the Philippines.

Reforestation efforts in the Philippines rarely take into account the species composition of the original forest than once covered the area prior to logging. Emphasis is still laid on exotic "miracle trees" usually introduced from South America, Africa and Australia which are selected for their fast growth (Milan, 1996). Hence, a reforestation scheme was designed by the ViSCA-GTZ Applied Tropical Ecology Program which combines the considerations of preserving forest biodiversity with the need for food production and income generation. The scheme attempts to combine the essential elements of forest and food production system. It is designed to restore the natural forest area by using native

tree species instead of exotic tree species and at the same time provide farmers with good and stable income. This reforestation scheme is based on a preliminary hypothesis that a farming system in the humid tropics is increasingly more sustainable the closer it is in its species composition to the original local rainforest (Milan et al., 1994). Thus, the concept of rainforestation farming was conceived. Although a true copy of the original rainforest will no longer be called a farming system, however, in the process of adaptation, farmers will be able to pick out elements of the proposed system and combine them with farming practices either in a diverse or compartmentalized planting scheme (Margraf et al., 1996).

Objectives and strategies of rainforestation farming

Rainforestation farming aims to replace the more destructive form of "kaingin" practices, form a buffer zone around primary forests, protect the local biodiversity, help maintain the water cycle, and provide farmers a stable and high income. As the forest represent an important resource base for economic development, it has the capacity to provide a steady stream of income and subsistence products if managed wisely. It can also support other economic activities, for example, agriculture and fisheries, through its ecological services and functions. In a number of cases, technologies and policies aimed at protecting natural resources have neglected the fact that the lack of livelihood security would undermine the conservation objectives of the technology. Poverty and environmental degradation intensifies in areas where conservation activities are implemented. Rainforestation farming is unique in the sense that it takes into account the livelihood of the farmers and assures them of income while waiting for the benefits from the tree species they planted. Table 1 outlines the expenditures of establishing the demo farm in Cienda. Although labor extensive, the infusion of voluntary labor is evident.

In rainforestation farming, a recommended planting scheme is shown in Figure 1. During the first year of planting, sun demanding trees (Table 2) are planted at narrow spacing of 2 x 2 meters. These trees can close the canopy fast so that in the second year shade loving trees (Table 3) can be planted under the pioneer trees. Among the shade loving trees are most of the highly priced hardwood of the family Dipterocarpaceae. The high planting density which appears illogical by most foresters has a number of advantages: (a) the competition for light by individual trees favors straight bole growth; (b) the canopy closed fast and allows planting of shade out efficiently, thereby reducing time for maintenance; (d) in cases of pest outbreaks and typhoons as well as damage during harvesting, sufficient number of healthy stand remains; (e) thinning provides valuable firewood and poles and allows sufficient time for the selection of best performing species or individual trees (Plate 1).

Two years after the planting of trees, and depending on the soil and performance of the seedlings, the forest farm can be enriched with crops. Bananas, cassava, sweet potato and vegetables can be grown along with the young trees (Plate 2). Later, when the canopy closes, shade tolerant crops can be added, e.g. climbing ubi (Plate 3), some varieties of taro, takudo, pineapple, and others. Orchids, anthurium, and mushrooms have been found to grow well under the shade of growing forest and fruit trees. Certain varieties of abaca can thrive well with partial shading from trees with compound or small sized foliage. Table 4 shows

TABLE 1. Cost of activities for the establishment of Cienda-San Vicente Farmers' Association (CSVFA) RF Cooperator's Farm and nursery at Sitio Cienda, Gabas, Baybay, Leyte (with a total area of 9,707 sq.m.) for 3 years.

Activity(ies)	Cost	
	Project	Cooperator
Pre-establishment		
• Hauling of seedlings from the FORI nursery to CSVFA's RF Cooprator's Farm	3,723.81	
RF Implementation		
• Planting materials		
• Pioneer tree species	4,568.00	
• Fruit tree seedlings	6,138.00	
• Rattan (140 seedlings at P2.00/seedling)		280.00
• Dipterocarp tree species	8,470.00	
• Vegetables and root/perennial crops	23,132.50	150.00
• Labor inputs (value based on local hiring)		62,600.00
• Bamboo poles used as sticks during lay-outing and staking activitity (150 poles at P50.00/pole)		7,500.00
• Barbed wire (4 rolls at P780.00/roll)	1,560.00	
Maintenance and harvesting		
• Replacement of mortalities		558.00
• Fertilizer		4,560.00
• Labor inputs		8,250.00
TOTAL	43,868.50	83,898.00

the income derived by farmers on the crops planted in between trees. Hence, while waiting for trees to grow, income can be derived from intercrops.

Since the benefits from the trees will take time to come, growing cash crops under them is most welcomed by farmers. The prospect of earning while waiting for the trees to mature makes rainforestation attractive or acceptable to potential adoptors. Aside from promoting biodiversity in their farms, farmers will be deriving income from the food crops grown together with the trees. The study of Bulayog (1998) of upland farmers in Mount Pangasugan revealed that farmers grow more than one crop on their farms not primarily because they want to promote biodiversity but for other reasons. Farmers grow a wide variety of crops so that they could harvest more than one crop and could sell different kinds of crops in the market. According to the farmers, maintaining more than one crop allows them to have cash crops while waiting for the long term crops to be harvested. They also maintained that the practice also maximize the use of the land. These findings supported the thesis of rainforestation concept. The technology is not entirely different from what the farmers are actually doing. Farmers are actually growing crops under the trees and are deriving income from them. This implies that farmers will accept a technology that preserves biodiversity if it is profitable and assures them of income for their family needs

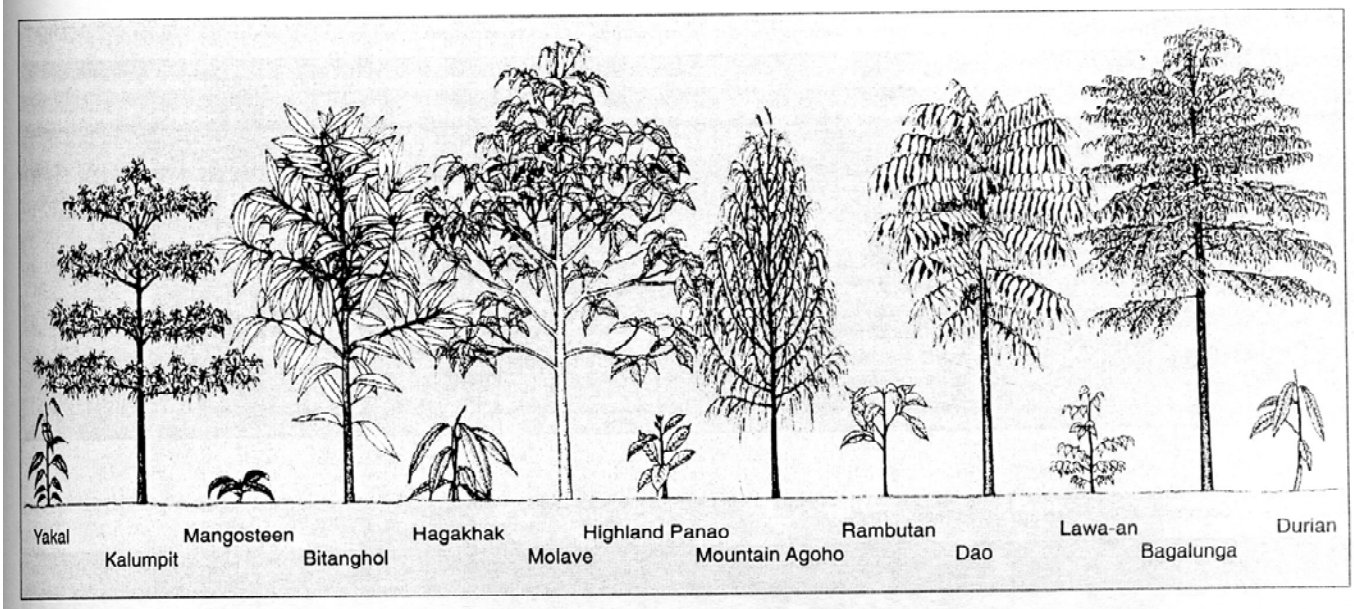

FIGURE 1. Rainforestation farming planting scheme.

TABLE 2. First year of planting: sun demanding trees.

Official Local Name	Scientific Name	Family	Economic Quality
Agoho	*Casuarina equisetifolia*	Casuarinaceae	good, house posts
Akleng-parang	*Albizia procera*	Mimosaceae	! superb ! furniture
Amugis	*Koordersiodendron pinnatum*	Anacardiaceae	! superb ! all purpose
Bagalunga	*Melia dubia*	Meliaceae	light construction, Pioneer
Bagras	*Eucalyptus deglupta*	Myrtaceae	good, construction, pulb
Banai-banai	*Radermachera pinnata*	Bignoniaceae	good, all purpose, Pioneer
Bitanghol	*Calophyllum blancoi*	Clusiaceae	good, all purpose
Bogo	*Garuga floribunda*	Burseraceae	! superb ! all purpose
Danupra	*Toona sureni*	Meliaceae	good, house construction
Dao	*Dracontomelon dao*	Anacardiaceae	! superb ! furniture
Gumihan	*Artocarpus sericicarpus*	Moraceae	! superb! all purpose, boats

TABLE 2 *continuation...*

Official Local Name	Scientific Name	Family	Economic Quality
Kalumpit	*Terminalia microcarpa*	Combretaceae	light construction; (wine)
Lamio	*Dracontomelon edule*	Anacardiaceae	good, construction
Lingo-lingo	*Vitex turczanihowii*	Verbenaceae	good, constr., music.instr.
Malabayabas	*Tristania decorticata*	Myrtaceae	! superb ! heavy construct.
Malugai	*Pometia pinnata*	Sapindaceae	! superb ! all purpose
Mntn. Agoho	*Casuarina nodiflora*	Casuarinaceae	good, house construction
Molave	*Vitex parviflora*	Verbenaceae	! superb ! all purpose
Narra	*Pterocarpus indicus*	Fabaceae	! superb ! furniture
Philippine Teak	*Tectona philippinensis*	Verbenaceae	! superb ! heavy construct.
Talisay Gubat	*Terminalia foetidissima*	Combretaceae	good, house constr., boats
Tindalo	*Afzelia rhomboidea*	Caesalpiniaceae	! superb ! all purpose
Toog	*Petersianthus quadrialatus*	Lecythidaceae	! superb ! all purpose

TABE 3. Second year of planting: shade loving trees.

Official Local Name	Scientific Name	Family	Economic Quality
Almon	*Shorea almon*	Dipterocarpaceae	! superb! all purpose
Bagtikan	*Parashorea malaanonan*	Dipterocarpaceae	! superb! all purpose
Balobo	*Diplodiscus paniculatus*	Tiliaceae	good, light construction
Dalingdingan	*Hopea foxworthyi*	Dipterocarpaceae	! superb! all purpose
Dungan	*Heritiera sylvatica*	Sterculiaceae	! superb! construct., posts
Gisok-gisok	*Hopea philippinensis*	Dipterocarpaceae	good, construction
Guijo	*Shorea guiso*	Dipterocarpaceae	! superb! all purpose
Hagakhak	*Dipterocarpus validus*	Dipterocarpaceae	! superb! all purpose
Kamagong	*Diospyros philippinensis*	Ebenaceae	good, furnitureDungan
Kulatingan	*Pterospermum obliquum*	Sterculiaceae	good, construction
Manggachupi	*Hopea acuminata*	Dipterocarpaceae	! superb! hard construct
Mayapis	*Shorea palosapis*	Dipterocarpaceae	! superb! all purpose
Palosapis	*Anisoptera thurifera*	Dipterocarpaceae	! superb! all purpose
Red Lauan	*Shorea negrosensis*	Dipterocarpaceae	! superb! all purpose
Talakatak	*Castanopsis philippinensis*	Fagaceae	! superb! furniture
Tangile	*Shorea polysperma*	Dipterocarpaceae	! superb! all purpose
Ulaian	*Lithocarpus pruinosa*	Fagaceae	good, construction
White Lauan	*Shorea contorta*	Dipterocarpaceae	! superb! all purpose
Yakal-kaliot	*Hopea malibato*	Dipterocarpaceae	! superb! hard construct
Yakal-malibato	*Shorea malibato*	Dipterocarpaceae	! superb! hard construct

Food for thought and recommendations

- Rainforestation farming as a form of land use could be a better source of income than monoculture of agricultural crops.
- Forest rehabilitation could be attained if farmers are assisted (financially or otherwise) in planting trees especially in the initial years of establishment of a Rainforestation Farm.
- Rainforestation farming could success if tree farmers are allowed to profit from products in their tree farm.
- As the benefits of rainforestation farming are not all together marketable and adoption of rainforestation farming depends on various socio-economic and cultural values of cooperators, environmental education should stress the ecological function of trees/forests.
- As the full benefit of RF cannot be realized by farmers during his lifetime, the adoption and acceptance of RF lies in his values and the premium he put on the ecological benefits of RF that will be enjoyed by his heirs and the society at large.
- In the context of devolution, certain functions of line agencies such as forest protection and preservation, reforestation and policing can be given to communities who have a track record of being environmentally concientious and committed to accept these functions.

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References

BULAYOG, M.S.B., 1998. Economic Implications of Biodiversity Preservation in Mount Pangasugan. PhD. Thesis. University of the Philippines, Los Baños, p. 153.

DARGANTES, B., 1996. Socio-ecological case studies on forest land cultivation in Leyte, Philippines. PLITS 14(2), University of Hohenheim, Germany, p. 191.

MARGRAF, J. and P.P. MILAN, 1996. Ecology of dipterocarp forests and its relevance for island rehabilitation in Leyte, Philippines. In: Schulte, A. and D. Schone (Eds.): Dipterocarp Forest Ecosystems. World Scientific, Singapore, 124-152 pp.

MILAN, P.P., 1996. Conserving biodiversity through watershed management. Paper presented at the Colegio de San Juan de Letran, Calamba, on the occasion of their Foundation Day, March 11.

MILAN, P.P. and J. MARGRAF, 1994. Rainforestation farming: an alternative to conventional concepts. Proc. Sustainable Alternative Livelihood Project Symposium. Quezon City, Philippines, Nov. 10-11, p. 2.

PRABHU, B.R., H.J. WEIDELT and S. LEINERT, 1993. Erfahrungen und Moeglichkeiten einer nachhaltigen Bewirtschaftung von artenreichen tropischen regenwaeldern. Forschungsberichte BMZ 109, Weltforum Verlag Munchen, Koln, London.

SCHADE, J., C.V. GULMATICO, M.L. BAL, C.D.E. BARRER, J. KIRCHHOFF, R. LENNERTZ, P.A. MEDENILLA, L.O. PESCASIO and K. UBELHOR, 1988. Natural forest resources of the Philippines. Philippine-German Forest Resources Inventory Project, Forest Management Bureau, DENR, Manila, p. 62.