ESPAM MFL
ESCUELA SUPERIOR POLITÉCNICA AGROPECUARIA DE MANABÍ
"MANUEL FÉLIX LÓPEZ"
Ley 2006 – 49 Suplemento R.O. 298 – 23 – 06 - 2006
CALCETA – ECUADOR

CAN THE REFORESTATION PROJECTS STOP THE EXTRACTION OF TIMBER FROM THE PROTECTED FOREST CHONGÓN-COLONCHE?

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Abstract

In September 1994, the mountain range Chongón-Colonche was declared "Protected Forest and Vegetation" (PFCC) with the aim of achieving conservation of the Pre-mountain Humid Forest (pm HF), Tropical Dry Forest (TdF) and protection of the micro-basins as water sources to the rivers in the area. As a strategy in order to compensate for the extraction of wood, forest plantations were promoted since 1998 underneath different systems in the area of the BsT in the region of the mountain range Chongón-Colonche. In those plantations a total of 45 species have been used, where most of them were native trees in an area of 2,231 ha. This investigation has an objective to present a growth development evaluation of the species with fast and moderate growth as well as a socio-economic analysis. The use of 45 species of trees shows that the project objectives of reforestation were not clear when speaking of: protected reforestation or the rehabilitation in terms of the management of micro-basins, commercial reforestation of the production of quality wood, or social reforestation that could be viewed as short and/or medium term compensation to stop the extraction of timber from PFCC. When the general objective of the project is not related to the management of the natural resources but instead linked to creating employment, it is not possible to achieve the objectives of conservation. Based on the analytical framework of benefit cost analysis, the only species that presented an economic benefit were those who grew fast. The short term economic returns of land and labour from forestation were substantially lower than those generated from cash crop production in the research area. The use of incentives is often attached to technical solutions defined by a top-down approach based on developed technologies with little participation. For this reason a participatory development of technology should be emphasized in range and education instead of direct incentives. Finally, despite the existence of de facto conservation (protected forest), on-farm conservation (as a public conservation strategy) could be a viable alternative for moderate and slow growing species with valuable timber. The strategy ought to be a task of the National Direction of Fitogenetic Resources (DINAREF) and National Forest Program of INIAP.

INTRODUCTION

The Forest Program created by the Ministry of Agriculture, Cattle Ranching and Fishery in Ecuador (MAGAP) had as purpose to promote forest plantations, establishment of agro-silvopastoral systems and forest protection in a total area of 1'000,000 ha in a time frame of 20 years (MAGAP, 2008). The proposal included the aim of recovering degraded areas and at the same time generating sources of income for the small farmers through the forest production (SENPLADES, 2007). Such ambitious goals at national level contrast with the result of the evaluation performed by the project "Reforestation and Conservation of the Chongón-Colonche Mountain Range" financed by the German Reconstruction Bank (KfW), Fundación Natura (local NGO) and Ecuadorian Ministry of Environment (MAE). The main objective of this project was to establish forest plantation in order to compensate for the extraction of timber from the Protected Forest Chongón-Colonche (GFA, 2002). According to the aim of 13,000 ha of reforestation, only 2,231 ha were planted after ten years. The promotion of the forest plantations was based on the payment form of incentives (US $359.83). 75% was expenditure for the establishment and the last 25% were allocated in a three year period with the purpose of accordingly ensuring the establishment of the plantation. The favoured plantation system selected by the farmers was 5x5 m. with a total of 400 trees/ha. In those plantations a total of 45 species had been used, most of them were native trees (GFA, 2002). This investigation has as objective to present an evaluation of the species with fast and moderate growth included a socio-economic analysis.

MATERIAL AND METHODS

The Protected Forest Chongón-Colonche (PFCC) is located in the central west coast of Ecuador taking up a total of 79,000 ha; its buffer area is 254,000 ha and belongs to the ecological zone Pre-mountain Humid Forest (pm HF) and Tropical Dry Forest (TdF) (CAÑADAS, 1983). The ranges of precipitation fluctuate between 391.60 to 1,391.50 mm/year and temperature ranges oscillate between 28 and 20°C.

Growth Development Evaluation

In 2004, the establishment of temporary plots was a quick solution to the project where nothing was known about the performance of 45 species in this particular region. The information was used to classify the 45 species in fast, moderated and slow growing trees. Between 2004 and 2009, interval plots were measured twice for Pachaco (*Schizolobium parahybum*) as a fast growing and Laurel (*Cordia alliodora*) as a moderate growing tree. Site Index, Mean Annual Increment and Current Annual Increment for those species were performed.

Assessing the Economic Profitability

The Net Present Value (NPV) of a project is simply the sum of its discounted cash flows. For the calculation of NPV, the following formula is used:

$$NPV = \sum_{t=0}^{n} \frac{B_t}{(1+i_t)^t} - \sum_{t=0}^{n} \frac{C_t}{(1+i_t)^t}$$

Where: *Bt* = benefits derived from the project in period t (income or revenue produced by the project)
Ct = the cost in period t
n = the lifespan of the project
it = the interest rate for discounting in period t

Benefit/Cost ratio (BCR) provides direct relationships between the benefits and costs of a project and uses these relationships to decide whether a particular project is a good investment. Its subsequent formula is the following:

$$BCR = \frac{\sum_{t=0}^{n} \frac{B_t}{(1+i_t)^t}}{\sum_{t=0}^{n} \frac{C_t}{(1+i_t)^t}}$$

Where *it* = the interest rate for discounting in period t

The average interest rate between saving and borrowing in Ecuador is 11.75% (BCE, 2009). In this study, for discounting purposes, an interest rate of 10% was applied and corresponds to the payment rate for forest projects of the National Bank of Development (Banco Nacional de Fomento).

Participatory Rural Appraisal

The methods of participatory rural appraisal (PRA) were applied in meetings with the communities to validate the information that was generated by the work groups (CHAMBERS and GUIJT, 1995). The presentation and analysis of the information obtained were discussed with communities. The sampling covered 20% of the total communities and agricultural groups.

RESULTS AND DISCUSSION

Total Performance and the Growth of Moderate and Fast Growing Trees

According to Gadow v. (2004) the cut point is produced when the Mean Annual Increment is below the Current Annual Increment. For the *C. alliodora*, the harvest point was established at 45 years with a final height of 16.58 m. which means an annual increment of 1.22 m^3/ha/year (Figure 1). Almost 89.03% of the plantation was done in such site index and therefore it became evident that it is inefficient to plant *C. alliodora* in poor sites. The rotation for maximum production increases rapidly with decreasing site index: from 5-6 years on the best sites to more than 20 years on the poorest sites (ALDER and MONTENGRO, 1999). On the other hand, a fast growing tree such as *S. parahybum* showed a harvest point at 18 year with a total height of 18.35 m. and 4.51 m^3/ha/year (Figure 2). Table 1 shows the discrepancies of prediction regarding tree growth and stand development between GFA (2002) and this study. Such inexact information was presented to the small farmers and thereby creating expectations of economic returns that did not correspond with the reality in the field. This fact is reflected in the declarations of Auberto Ricse, forest technician, cited by Hoch et. al., (2008): "In 1980 it was discussed that if a plantation was established at this point, then we would be selling the plantation wood by year 2000. We are now in 2005 and we have not even sold a stick. Now the same issue as in 1980 is being discussed: that in year 2020 we will be selling wood. I am telling you it is easy to talk but we need to be more serious". Obviously, the data in Table 1 have direct influence and they leave out the basis for the calculations of profitability based on the method Net Present Value of GFA (2002).

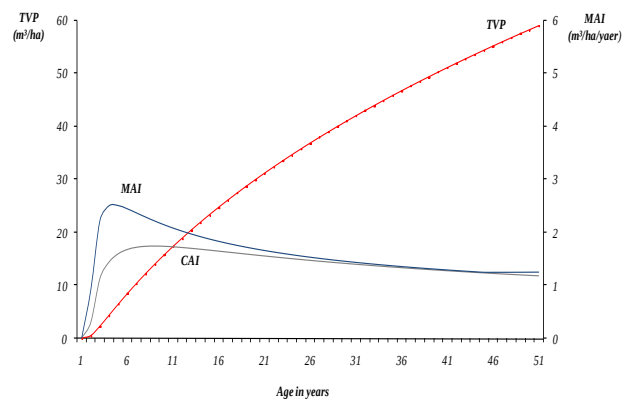

Figure 1. TVP (Total Production Volume), MAI (Mean Annual Increment) and CAI (Current Annual Increment) for C. alliodora.

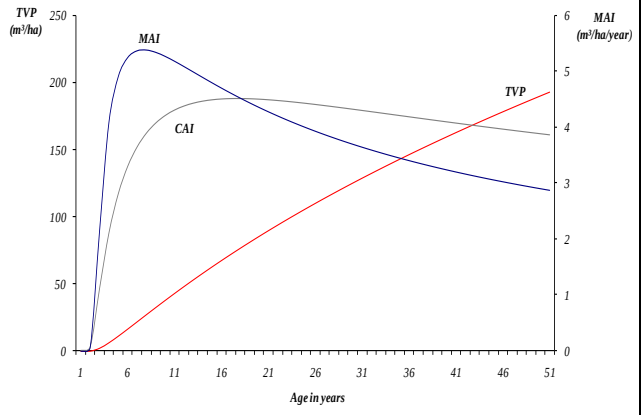

Figure 2. TVP (Total Production Volume), MAI (Mean Annual Increment) and CAI (Current Annual Increment) for S. parahybum.

Profit Analysis of the Plantations

In Table 2, the values of the NPV and BCR for the plantations of species with fast (*S. parahybum*) and medium growth (*C. alliodora*) are specified. The NPV with Incentive contemplates the expenses for a technical advisor for the forest plantations.

Table 1. Timber production prediction for different species according to GFA (2002) and this research.

Species	Data from GFA (2002)		Data from this research	
	Production m^3/250 trees/ha	Cut cycle in years	Production m^3/400 trees/ha	Cut cycle in years
Schizolobium parahybum	50.00	25	81.30 - 198.00	18
Cordia alliodora	52.50	25	55.00 - 110.00	45
Cederela odorata	87.50-140.00	25	55.00 -110.00	45
Vitex gigantean	50.00	25	55.00 -110.00	95
Prosopis juliflora	50.00	25	-	-
Tectona grandis	70.00-100.00	25	55.00 - 110.00	45

The species with moderate and therefore low growing rates showed a negative NPV and the BCR is less than 1. This fact demonstrated the lack of economic viability of the reforestations carried out with these species, which represent 96.80% of species used in the project. The rest of species, 3.20%, were economically profitable. Without incentives, the reforestation activities with fast growing species showed to be four times less than the profitability of cattle ranching (24.00$/ha/year) and national cacao plantation in an agroforestry system (29.70$/ha/year) in the Cascol community.

Table 2. Cost/Benefit analysis for fast and moderate growing trees with a density of 400 trees/ha, Protected Forest Chongón- Colonche.

Forest species	NPV with Incentive $/ha/year	NPV without Incentive $/ha/year	RB/C with Incentive	RB/C without Incentive
Fast growing trees	17.95	6.47	1.81	1.19
Moderate growing trees	-2.68	-8.07	0.58	0.18

This fact demonstrates that reforestation projects would always require payments associated with the environmental services of forests in order to be a feasible land use alternative (OLSCHEWSKI and BENÍTEZ, 2005). The spatial spread sheet of the total plantations carried out by the project is represented in Figure 3. This fact did not correspond with the objectives of a project of reforestation, when speaking of: protected reforestation or rehabilitation in terms of the management of micro-basins, commercial reforestation of the production of quality timber, or social reforestation that could be viewed as short and/or medium term compensation. It does not correspond because of the fact that the forest resources were not used within the PFCC and thus a substitution could be a medium and/or long term solution with timber coming from the reforestation of the buffer zone of the PFCC.

Social Evaluation

The absolute presence of masculine beneficiaries in the field meetings of this research is a sample of the lack of focus in the incentive as for aspects related to gender. Most of the male assistants are owners of the land and they were in better position of benefitting from the direct incentive due to the demands of the project. This also implied that the women were in a weaker position to benefit from the incentives employed by the project. It is evident that no gender and empowerment impact assessment has been incorporated in the project strategy (SKJONSBERG, 2001). According to the field interviews, the efficiency of the incentive (EI) for the establishment of the plantation can be strongly influenced by:

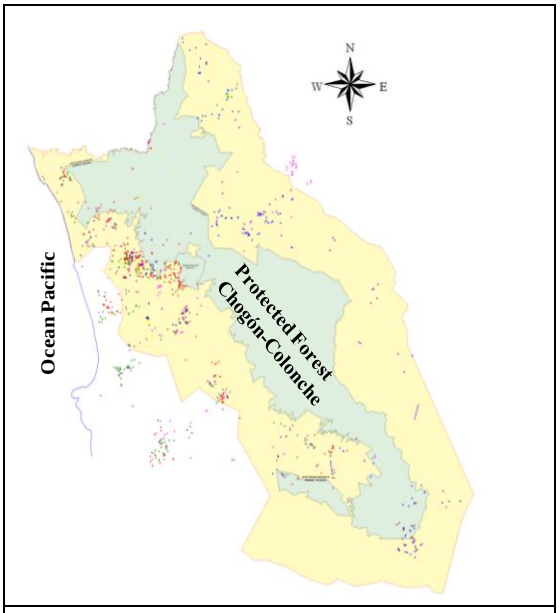

Figure 3. Spatial distribution of the plantation, Protected Forest Chongón-Colonche.

(M) Motivation: In the field meetings with the communities, beneficiaries expressed that the incentive should have been as high as $400 per reforested hectare. With participatory methods, the cost of establishment of one hectare with 400 trees/ha was determined and it was demonstrated that the incentive of the reforestation project paid 75.00% of the total costs. When one asked why the incentive should be increased, nobody was able to offer reasons of such an increment. In the end, they already knew by experience that the reforestation with low and moderate growing trees is no profitable activity. Consequently the average area of reforestation was of only 1.40 ha (GFA, 2002). When one asked if they would like to carry out a reforestation without incentives, they answered with a clear NO.

(FP) Payment Form: The project has offered eleven different plantation systems from 1,110 trees/ha to 400 trees/ha with differentiated rates of the incentive for each form of plantations. In spite of this, the beneficiaries chose the system with less trees/ha in order to avoid scarcity of time and labour demand for the agricultural production at the beginning of the raining season. The initial form was to pay 60% in the first three years and the rest within five years. The beneficiaries disagreed with the payment form of the incentive and therefore they pushed for changing this modality in the project and as a result, the final payment form was reduced to three years. This reflected the current economic situation of the target group, which was characterized by a notorious lack of liquidity and the fact that plantations did not generate short term resources. Conversely, the final outcome of the plantations had an average of 80% establishment and this was due to the payment form of the incentive in order to ensure the forest plantations (GFA, 2002). The number of species (45) and types of plantation systems (11) were predetermined with money incentives, which were linked with top down technical solutions defined by the project and lacking the participation of the communities.

(O) Objective: Most of the beneficiaries did not have a clear notion of the project reforestation objectives and its consequences on the conservation of the Protected Forest Chongón-Colonche. Obviously the possibility to attend marginal populations in a shot term period cannot be denied but what has to be questioned, is the utility of these instruments in relation to the execution of objectives in a longer term. When the main objective of the project is not related with the management of the natural resources but instead linked to creating employment, the conservation objectives will never be achieved.

CONCLUSION

- The intents of ten years of promoting forest plantations using incentives by international organisations along with the actual results of the Forest Program of MAGAP (200 ha of 50,000 ha/year of forest plantation at national level), will never have the possibility to be successful. This is to be moving against current if the following conditions are not changed: (i) the removal of the export prohibitions of forest products as well as the tariff and non-tariff barriers of the international trade of all products, (ii) the elimination of export subsidies and (iii) the removal of all the consumer taxes of the forest products with the exception of the general tax on the sale. According to Stewart y Gibson (1996), once these reforms become effective, the direct forest incentives are no longer necessary.

    - The reforestation projects can and will not be able to stop the extraction of timber from the Protect Forest Chongón-Colonche. This imply a loss of genetic forest resources and it is currently one of the major problems in the Protected Forest Chongón-Coloche especially for moderate and slow growing species with valuable timber. This loss is aggravated by the lack of policies to mitigate the impact of development interventions. Despite the existence of de facto conservation (protected forest), on-farm conservation (as a public conservation strategy) could be a viable alternative. Farmers are managing the huge stock of genetic resources and on-farm conservation policy should therefore involve them as the central actors in the implementation of this strategy. The viability of the strategy should be a task of the National Direction of Fitogenetic Resources (DINAREF) and National Forest Program of INIAP.

Bibliography

ALDER, D., and MONTENEGRO, F., 1999: Yield model for *Cordia alliodora* plantation in Ecuador. International Forest Review 1: 242-250.
BCE., 2009: Estadísticas de Tasas de Interés. Banco Central del Ecuador (BCE), Quito. Available at: www.bce.fin.ec.
CAÑADAS, L., 1983: El mapa bioclimático y ecológico del Ecuador. Editores Asociados. Quito. Ecuador. 210 p.
CHAMBERS, R., and GUIJT, J., 1995: PRA five years later. Where are we now? Forest, tree and People Newsletter, No. 26/27 April: 414.
GADOW, K. v., 2004: Forsteinrichtung, Steuerung und Analyse der Waldentwicklung. Beilage zur Vorlesung. Fakultät für Forstwissenschaften und Waldökologie. Universität Göttingen. 246 p.
GFA., 2002: Estudio para el ajuste del "Proyecto de Reforestación y Conservación de la Cordillera Chongón-Colonche. Fundación Natura/MAE. 83 p.
HOCH, L., POKORNY, B., and MEDINA, G., 2008: Plantaciones forestales para productores familiares en la Amazonía. Proyecto For Live. EU/CIFOR. 6 p.
MAGAP., 2008: Plan de Reactivación Agropecuario 2007-2011. MAGAP.
OLSCHEWSKI, R., and BENÍTEZ, P., 2005: Secondary forests as temporary carbon sinks? The economic impact of accounting methods on reforestation projects in the tropics. Ecological Economics: (55) 380– 394
SENPLADES., 2007: Plan Nacional de Desarrollo 2007-2010. Planificación hacia la Revolución Ciudadana. SENPLADES, Quito-Ecuador, 445 p.
SKJONSBERG, E., 2001: Gender and Empowerment Impact Assessment Manual. NPAID, Oslo. 14 p.
STEWART, R., and GIBSON, D., 1996: Efecto de las políticas agrícolas y forestales sobre el ambiente y el desarrollo económico de América Latina. Una síntesis de estudios de caso en Costa Rica, Bolivia y Ecuador. Documento del taller, Reforma de las políticas del gobierno relacionadas con la conservación y el desarrollo forestal e n América Latina, ed. H. Cortés. IICA. San José, Costa Rica.