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THE PRIVATE COSTS OF COMMERCIAL FORESTRY, REFORESTATION AND SOCIAL FORESTRY*

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The major private users of the country's upland resources have been loggers and upland-based farmers. Regulation of the activities of both groups by government has been premised on the need to safeguard the public interest, as well as to ensure fair distribution of the gains for society. The feasibility of control mechanisms, however, depends on the extent to which they are internalized by private decisionmakers, as well as on the administrative capability of government resource managers. Here, we analyze the private perspective of upland resource management mechanisms by drawing from the salient findings of studies on commercial forestry, reforestation and communal tree farming which were conducted under the PIDS/IDRC upland resources research program.

The first section discusses commercial forestry, including both natural forest stand and industrial forest management concerns. Reforestation costs are likewise taken up and policy implications are presented. The second section on communal tree farming projects considers this component of social forest management from the perspective of upland populations in particular and social forestry concepts in general. We then conclude by discussing implications on the framework for policymaking for upland and forest resource management.

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I. Commercial Forestry

The country's commercial forests are composed of the natural stands, the majority of which are dipterocarps and slow-growing, and the plantation forests, which are largely fast-growing. Traditionally, Philippine commercial forestry has implied the management of dipterocarp forest stands where logging of primary forests has been predominant for the last decades, followed by the present period of second-growth forest management. Concessions were granted for the harvest of natural forests through a regulatory scheme called the Selective Logging System (SLS). The firms paid government forest charges and the usual attendant license fees for private enterprises.

Information used in the tables that follow are based on a survey made on three logging firms covering two climatic types. The specific logging and reforestation sites on which primary data on costs was collected were chosen on the basis of site accessibility. An additional criterion for site collection was the availability of complementary information for predicting revenues based on growth and yield estimates from secondary forests.

1. *Dominance of Capital Expenditures in Natural Stand Management*

The costs entailed in private, commercial use of natural forests during the first cyclic cut are incurred mostly for road building during pre-logging operations and transport during harvest operations (Table 1). Cruz et.al (1987) estimated these components to average to 66 percent of costs, with 12 percent incurred during road building and 54 percent during transport.

A major portion of transport costs goes to capital equipment and fuel requirements, as shown in Table 2. In fact, even for those activities which comprise minor shares of the costs, such as harvest and post-harvest operations, expenses on spare parts and other materials are important. Thus, while a significant proportion of labor is employed in these activities, (e.g., 22 percent of total employment according to one firm's profile (Cruz and Tolentino, 1987)), capital expenditures are the single most important cost to logging firms.

2. *Low Forest Charges and High Profitability in Natural Forest Stand Management*

Indeed, the cost of primary, natural resource-based factors of production, such as land and timber resources, have been minimal. Thus, while the value of standing timber was in the range of ₱417-589 in 1985 (Table 3a), forest charges amounted to only 5-7 percent of stumpage values. When

Table 1

COST ESTIMATES FOR TWO NATURAL FOREST STANDS, 1985

(In Constant 1978 Pesos)

ITEM	Cost Per Hectare (P), First Cyclic Cut				Cost Per Hectare (P), Second Cyclic Cut			
	Area A	Area B	Weighted	Average %[a]	Area A	Area B	Weighted	Average (%)[a]
A. Pre-Logging Operation	2,555	1,406	1,762	(12.8)	1,049	604	742	(6.1)
1. Inventory and free marking	202	54	100	(0.7)	202	54	100	(0.8)
2. Road survey and setting lay-out	202	206	205	(1.5)	202	206	205	(1.7)
3. Road construction	2,151	1,146	1,457	(10.6)	645	344	437	(3.6)
B. Harvesting Operation	6,063	8,685	7,874	(57.1)	5,538	8,020	7,254	(59.6)
1. Felling and bucking	320	228	256	(1.9)	220	210	213	(1.8)
2. Minor transport	2,178	3,230	2,905	(21.0)	1,496	2,983	2,524	(20.7)
3. Major transport	3,412	5,138	4,604	(33.4)	3,718	4,745	4,428	(36.4)
4. Scaling	152	89	109	(0.8)	104	82	89	(0.7)
C. Post Harvest Operation	151	442	352	(2.5)	151	442	352	(2.9)
1. Residual inventory	67	14	31	(0.2)	67	14	31	(0.3)
2. Timber stand improvement	84	428	321	(2.3)	84	428	321	(2.6)
D. Overhead Cost	4,205	2,868	3,282	(23.8)	4,205	2,869	3,282	(27.0)
E. Forest Protection Cost	623	498	537	(3.9)	623	498	537	(4.4)
TOTAL[b]	₱13,597	₱13,899	₱13,806	(100.0)	₱11,566	₱12,433	₱12,267	(100.0)

a.) Weights are based on percent share of areas to total hectarage.

b.) Totals may not add up due to rounding.

Notes: 1. Values expressed in current 1985 prices are presented in Appendix Table 1.1

2. *Source:* Cruz and Tolentino (1987), Table 25, p. 66.

Table 2
COST OF INPUTS IN A NATURAL FOREST STANDS, 1985

ACTIVITY/ITEM	COST (in constant 1978 pesos)				
	Labor	Fuel and Oil	Spare Parts and Materials	Over-head	Total
A. Pre-logging	₱7,495.00	₱27,327.57	₱54,450.92	₱18,759.54	₱108,033.03
	(6.9)	(25.3)	(50.4)	(17.4)	(100.0)
1. Tree marking, per ha.	51.43	none	0.87	6.11	58.41
2. Road location survey and timber cruising, per ha.	28.88	none	4.41	5.41	38.70
3. Road construction, per km.	7,414.69	27,327.57	54,445.64	18,748.02	107,935.92
B. Harvesting per cu.m.	13.22	17.32	49.69	26.58[a]	106.81
	(12.4)	(16.2)	(46.5)	(24.9)	(100.0)
1. Felling and bucking	2.03	0.44	0.59		3.06
2. Yarding and skidding	5.92	3.69	9.32		18.93
3. Loading/unloading	3.26	3.84	4.54		11.64
4. Scaling	0.36	none	0.04		0.40
5. Hauling	1.65	9.35	35.20		46.20
C. Post Harvest, per ha.	32.87	–	44.37	8.27	85.51
	(38.5)		(51.9)	(9.7)	(100.0)
1. Residual inventory	14.39	none	1.17	2.10	17.66
2. Timber stand improvement	18.48	none	43.20	6.17	67.85

a. Based on 115 cu.m. log volume per hectare.

Notes: 1. Equivalent values in current 1980 prices are presented in Appendix Table 2.1

2. Figures in parentheses are percentage shares of totals.

Source: Cruz and Tolentino (1987), Table 20, p. 59.

Table 3
STUMPAGE VALUE DETERMINATION FOR NATURAL FOREST STANDS, 1985
(In Current Prices)

3a. Stumpage Value Computations: 30% Profit and Risk Margins	*Area A*	*Area B*
Price per cubic meter	₱1,000.0	₱1,000.0
Less cost, per cubic meter:		
a. Harvesting	319.4	245.7
1. Road survey and setting lay out	6.3	4.9
2. Road construction	65.9	28.2
3. Felling and bucking	9.9	5.6
4. Minor transport	66.6	79.0
5. Major transport	166.1	125.9
6. Scaling	4.6	2.1
b. Overhead	129.0	70.2
c. Margin for profit and risk (30% of a + b)	134.5	94.8
Stumpage value, per cu. m.[a]	₱417.1	₱589.3

3b. Profit and Risk Computations: ₱30 stumpage value	*Area A*	*Area B*
Price per cubic meter	1,000.0	1,000.0
Less: a. Harvest cost	319.4	245.7
b. Overhead cost	129.0	70.2
c. Implied profit & risk margins	116%	207%
Stumpage value, per cu.m.	₱30.0	₱30.0

Notes: a) Stumpage price = log market price
- harvest cost
- overhead cost
- (% profit & risk margins) x (harvest + overhead costs)

b) % Profit and risk margin
= [log market price - harvest cost - overhead cost - forest charge]/[harvest cost + overhead cost]

c) Equivalent values in constant 1978 prices are presented in Appendix Table 3.1

Source of basic data: Cruz & Tolentino (1987), Table 26, p. 68.

compared to log prices, a ₱30 per cubic meter forest charge was only, at most, 3 percent of the market price of logs in 1985.

A stumpage value that is not fully charged to logging firms implies that:

(a) firms have generally been underpaying for their use of timber resources;
(b) consequently, the effective margin for profit and risk has actually been at high levels; and
(c) wasteful use of timber has resulted in low recovery rates of only 50 percent. That is, society has actually been subsidizing the highly profitable and wasteful timber harvesting industry.

The effective profit and risk figures indicated in Table 3b were derived by applying the ₱30 per cubic meter forest charges paid by logging firms as the stumpage value, and applying the other figures in Table 3a. High levels of 116-207 percent for the two firms studied were obtained, implying that firms which have been allowed to manage the country's natural forest stands have been maximizing returns to capital (their foremost limiting factor of production) at large profitability and risk margins.

Consequently, the incentive for entering the logging business has been unusually high, resulting in a larger industry than would have resulted in a situation where forest charges adequately reflected stumpage values. Indeed, during the mid- seventies, when log prices were high and forest charges were lower than ₱30/cu.m., the area under logging licenses reached eight million hectares compared to only 4.6 million in 1958 (Segura, *et al.,* 1977).

Given this profit picture and the complicated regulatory tools of forest administration, the incentive for economic rentseeking activities (e.g., corruption, favoritism in the award of licenses, etc.) was therefore considerable. Additionally, it may be argued that the situation was made worse owing to an uncertain imposition of the total log export ban (scheduled for 1976 but successively postponed for full implementation, and eventually, resulting in export quotas).

3. *Efficiency of Natural Forest Stand Management in the 1980's*

We now examine the private profitability of natural forest stand management, given some changes in the regulations or constraints faced by logging firms. Table 4 presents computations of net present worth and benefit cost ratios for two kinds of natural forest stands belonging to different climatic types. The figures indicate that :

a. *For the same firm, an increase in license tenure from 50 years to 100 years does not significantly increase the firm's profitability.*

Table 4
NET PRESENT WORTH AND BENEFIT-COST RATIO, NATURAL FOREST STANDS, 1985-2010
(in constant 1978 prices)

ITEM	*AREA A*				*AREA B*			
	Net Present Worth (in thousand pesos)		*Benefit-Cost Ratio*		*Net Present Worth (in thousand pesos)*		*Benefit-Cost Ratio*	
	18%	*24%*	*18%*	*24%*	*18%*	*24%*	*18%*	*24%*
A. 50 years								
1. Original benefits and costs data	₱128,199	96,279	1.7	1.7	273,583	205,630	2.3	2.3
2. + 100% in forest charges	98,526	74,354	1.5	1.5	221,887	166,842	1.8	1.8
3. + 20% in costs, except forest charges	102,288	76,954	1.5	1.5	240,895	183,176	2.0	2.0
4. Operable area fixed at 40,000 hectares, original benefits and costs data	75,588	56,758	1.7	1.7	145,107	109,065	2.3	2.3
B. 100 years								
1. Original benefits and costs data	128,220	96,280	1.7	1.7	273,647	205,634	2.3	2.3
2. + 100% in forest changes	98,541	74,355	1.5	1.5	221,940	166,846	1.8	1.8
3. + 20% in costs, except forest charges	102,304	76,955	1.5	1.5	240,952	183,180	2.0	2.0

Notes: a.) Year 0 = 1985
Source: Cruz and Tolentino (1987), Tables 27-29, pp. 70-73.

This follows from the effect of discounting, which makes net earnings earned earlier more important than those obtained in the future. In fact, a relatively higher volume expected in the second cut due to the conduct of timber stand improvement (TSI) (accompanied by additional management expenses) may not necessarily assure a higher present value of net benefits for the firm, again due to the discounting effect (Cruz, 1982).

Rather, the effect of lengthening the tenure of firms may be considered more important in terms of its impact on the firms' consideration of uncertainty in securing the future gains from current investments in timber stand improvement. Certainly, short license tenure that would prevent firms from reaping the future benefits of increased (or sustained) yield from secondary forests would also discourage timber stand improvements or enrichment planting of logged-over forests. Moreover, while the conduct of TSI may not considerably make an impact on the firm's profitability, the rationale for undertaking it, from a societal perspective, should be the enhancement of raw material supply for the domestic wood processing industry.

b. *A doubling of forest charges lowers the net present worth, but not significantly enough to make logging of natural forest stands unprofitable.*

This will result in an increase in the government's share of revenue from logging which is long overdue, and need not result in the extinction of industries based on natural forests. In fact, higher forest charges that properly reflect stumpage values should increase efficiency of the industry, since those firms which should have not been in the logging business in the first place (but were encouraged to be so due to extreme underpricing of timber resources) would no longer find it worthwhile to continue production.

c. *Limiting the operable area to a smaller size of 40,000 hectares does not appear to diminish the attractiveness of logging, as measured by benefit-cost ratios. This result, however, follows from data limitations since, for some computations, per unit area cost estimates were used.*

Notwithstanding such information constraints, however, there is a need to explore further the feasibility of reduced license areas cum application of more labor-intensive technologies, since both have serious implications on providing the potential for redistributing benefits more equitably. Corollary to this is the granting of license permits to community-based logging to help solve the upland population problem and to discourage capital intensive technologies which have pervaded the commercial forestry sector (Laarman, 1981).

d. *An increase in costs (primarily of capital expenditures) by 20 percent diminishes the present value of net earnings.*

The relative importance of capital expenses to total costs makes the firms sensitive to changes in such costs. But, while net present earnings decrease due to higher capital expenses, only an unusual occurrence (e.g., extremely high inflation) will make firms lose business. Thus, what seem to have worried firms during periods of rising costs may have been lower profits relative to previous levels rather than losses per se.

e. *An increase in the interest rate from 18 to 24 percent reduces present net worth, but not to the point of making the activity unprofitable.*

This is similar to the earlier case of increased capital costs. An interesting point to tackle, however, is that made by conservationists on the need to apply lower discount rates to forestry-related activities due to its peculiar characteristic of long growing period. While this may initially result in lower time preference rates or diminish eagerness to receive revenues at an earlier point in time, it also has the effect of cheapening capital relative to other factor prices. Eventually, this distortion may lead to a cheapening of primary use of the forest, that is, an increase in logging activities.

Management of natural forest stands is, therefore, more sensitive to increases in costs, rather than to changes in license tenure or the discount rate. There is room for increasing society's share of revenues from the use of these forests through the imposition of higher forest charges. There is, likewise, a potential for a redistribution of access to the benefits of activities based on natural forest stands through reduction of license areas and the application of more labor-using technologies.

There are other important considerations that were not captured by the data presented above. One is the fact that increases in the costs of factor input are usually accompanied by rising output prices. Thus, given that forest charges have not been correspondingly adjusted, firms need not realized lower profits relative to previous levels unless a decrease in yield or harvest cut per unit area was also experienced. Moncayo's (1988) case study of small, medium and large firms in one region however revealed consistent declines in profit and risk margins during 1979-1983. Here, the need for implementing post harvest operations, such as timber stand improvement, to assure a healthy growing residual, again, cannot be over-emphasized.

4. *Costs and Profitability of Plantations*

The development of plantations is labor using (Table 5) and incurs the

Table 5
INPUT REQUIREMENTS FOR PLANTATION DEVELOPMENT OF MOLUCCAN SAU PLANTATIONS IN ONE STUDY SITE

ACTIVITY	*INPUT REQUIRED PER HECTARE*
1. Site preparation (second growth forest and abandoned idle lands)	17 man-days
2. Planting and staking	
a. seedlings	1,111 seedlings for 3 m. x 3 m. spacing
b. labor	5 man-days
3. Maintenance	
a. labor for weeding and brushing	17 man-days
4. Fertilizer application	
a. Fertilizer	14 kgms per year
b. labor	5 man-days per application

Source: Cruz and Tolentino (1987), Table 31, p.78.

largest per hectare cost during the first year of operation (Table 6). Planting and maintenance activities compose the larger shares of total costs, amounting to 70 percent during the first year and up to 90 percent in the second year.

Profitability varies according to the species' rotation length, site conditions, and type of management. Table 7 indicates that *bagras* plantations, which have shorter rotation lengths, tend to be more favorable than those of the other species. Moreover, variations in site conditions result in a wide range of profitability, as in the case of growing *yemane*.

5. *Constraints in the Feasibility of Plantations*

To investigate the sensitivity of plantation management to changes in constraints, we examine *bagras* plantations which, as previously indicated in Table 7, tend to be more profitable than growing *yemane or mollucan sau*. The figures in Table 8, which are based on a 1,000 hectare plantation (the maximum area granted under present policy) show that:

a. *The feasibility of plantations is highly dependent on the cost of capital.*

Table 6
PLANTATION COSTS IN TWO SAMPLE SITES, 1985
(Per Hectare, in Current Prices)

Activity	Bagras or Moluccan Sau	Yemane
A. YEAR I		
1. Site preparation	₱ 703	₱ 703
2. Nursery and field planting	2,125	1,958
3. Maintenance	1,833	1,010
4. Overhead	399	399
5. Others	320	320
TOTAL	₱5,380	₱4,390
B. YEAR 2		
1. Maintenance	1,401	514
2. Overhead	140	51
TOTAL	₱1,541	₱1,541

Source: Cruz and Tolentino (1987), Tables 32 and 33, in equivalent 1978 prices.

Table 7
PROFITABILITY OF INDUSTRIAL TREE PLANTATIONS

Plantation Type		Present Net Worth (in constant 1978 prices) 1985-2010	Benefit Cost Ratio
Bagras			
Study site	II-2	₱1,314,770	1.8
	II-3	1,197,350	1.7
	II-4	1,633,120	2.3
Average		₱1,381,747	2.0
Yemane			
Study site	II-2	₱ 42,850	0.9
	II-3	143,670	0.8
	II-4	112,370	1.2
Average		₱ 3,850	1.0
Moluccan sau			
Study site	II-2	₱ 856,320	1.6
	II-3	738,900	1.4
	II-4	1,174,670	1.9
Average		₱ 391,557	1.6

Notes: a.) Based on a discount rate of 18%; year 0 = 1985.
Source: C.A. Cruz and V.D. Tolentino (1987), Tables 39-47, pp.87-100; based on data from 1985 survey, NITC, and Cueto (1981).

Table 8
SENSITIVITY ANALYSIS FOR A BAGRAS PLANTATION

ITEM	NET PRESENT WORTH (PESOS) in constant 1978 prices 18%	24%	BENEFIT-COST RATIO 18%	24%
25-Year Analysis Period				
Study Site II-2				
a. +20% in cost of plantation establishment and management	983,360	108,300	1.5	1.1
b. +100 in application fee and land rental	1,312,120	337,170	1.8	1.3
c. Original cost data	1,314,770	339,100	1.8	1.3
Study Site II-3				
a. +20% in cost of plantation establishment and management	855,100	3,500	1.4	1.0
b. +100% in application fee and land rental	1,194,700	24,382	1.7	1.2
c. Original cost data	1,197,350	245,750	1.7	1.2
Study Site II-4				
a. +20% in cost of plantation establishment and management	1,383,720	373,870	1.9	1.3
b. +100% in application fee and land rental	1,630,450	558,470	2.3	1.6
c. Original cost data	1,633,120	560,600	2.3	1.6
50-Year Analysis Period				
Study Site II-2				
a. +20% in cost of plantation establishment and management	1,084,620	127,360	1.6	1.1
b. +100% in application fee and land rental	1,413,820	355,960	1.9	1.3
c. Original cost data	1,416,560	357,910	1.9	1.3
Study Site II-3				
a. +20% in cost of plantation establishment and management	954,020	15,050	1.5	1.0
b. +100% in application fee and land rental	1,299,470	263,650	1.8	1.2
c. Original cost data	1,302,210	265,600	1.8	1.2
Study Site II-4				
a. +20% in cost of plantation establishment and management	1,494,070	394,790	2.0	1.4
b. +100% in application fee and land rental	1,744,280	580,280	2.4	1.6
c. Original cost data	2,686,340	582,200	2.4	1.6

Source: Cruz and Tolentino (1987), Table 48, p. 102.

Given the same study site and period of analysis, a 33 percent rise in the interest rate from 18 to 24 percent decreases profitability significantly. For example, the present net worth declines from ₱1,633,120 to ₱560,600.

b. *Longer tenure slightly improves the profitability of plantations.*

According to the table, an increase in the analysis period from 25 years to 50 years raises the present net worth of *bagras* plantations, with a degree that depends considerably on the plantation site. Again, as in the case of natural forest stands, a stronger case for lengthening tenure will have to be based on other considerations as well, such as continuity of raw material supply for the wood-using industries.

c. *The profitability of plantations is highly sensitive to the cost of establishment and management.*

An increase in establishment and management costs by 20 percent significantly lowers profitability by much larger percentages, particularly at higher costs of capital. For instance, the extreme case of a reduction of present net worth from ₱245,750 to ₱3,500 for study site II-4 when the rate of interest is 24 percent may be noted. This follows from our earlier observation on the importance of such types of costs to plantations.

d. *Plantation profitability is not sensitive to cost of application and land values.*

A doubling of application fees and land rent is not expected to have significant impacts on plantations because these are currently at low levels, and, therefore, comprise an insignificant share of total costs. This arises from present policy which tries to encourage industrial tree plantations by charging minimal fees which are paid only during the later years (e.g., after a grace period). However, given the alternative uses of forest lands, such as maintenance of natural forest stands or establishment of agro-forestry, charges on the use of land for industrial tree plantations should at least approximate the attendant opportunity costs. In this case, there is room for increased government revenue and fairer returns to society by imposing higher land rent.

Certain policies for encouraging industrial tree plantations need to be re-evaluated in the light of these findings. In addition, other considerations, such as higher risks in monoculture three crops and the option value of forest land, should be taken into account. With respect to the latter, it may be argued that converting lands which are presently under industrial tree plantations into other uses in the future may be more difficult than starting from natural forest stands. That is, there may be a reduction in the range of choices for future opportunities once industrial tree plantations shall have been established. This implies that there is a need to examine forest land-use from a broad perspective.

6. *Reforestation Costs*

The costs of reforestation, in government projects in four study sites, as presented in Table 9, show the importance of maintenance activities.

Table 9
REFORESTATION COSTS, 1985
(In Current Prices)

ITEM	*COST PER HECTARE (PESOS)*			
	SS III-1	*SS III-2*	*SS III-3*	*SS III-4*
1. Reforestation survey	54	102	no data	no data
2. Nursery operation (seedling production)	1216	204	164	814
3. Plantation establishment (site preparation, planting and replanting)	1215	1135	218	1552
4. Planting maintenance	1588	1667	2023	minimal
a) Silvicultural treatment (weeding,brushing,etc.)	152	627	no data	226
b) Trail construction and maintenance	798	15360[a]	226[a]	
c) Fire break/fire line construction per kilometer	638	no data	1761	
d) Protection	no data	123	36	
e) Others	none	610[b]	none	
5. Overhead	no data	1755	242	74

Notes:
a. Per kilometer or P=307.18 at 20 m. per ha., trail density.
b. Road maintenance and tractor working.

Source: Cruz and Tolentino (1987), p. 105, in equivalent 1978 prices.

Indeed, it is this component which has been cited as crucial to the success of reforestation projects. Information on overhead costs entailed in specific sites is excluded in these survey-based figures, however, because reforestation is only one among the many activities conducted by government .

But approximations indicate that when such expenses are accounted for, establishment costs run to as much as ₱20,000 per hectare, with 84 percent incurred during the year of establishment and the rest during the subsequent two years of maintenance (Table 10). Nursery operations comprise a substantial portion of initial operations according to these figures from the Department of Environment and Natural Resources.

It may be noted that the species planted in government reforestation projects are mostly slow growing hardwoods, compared to the faster growing species (e.g., *Albizzia falcataria*) in plantations. Thus, the comparisons we are drawing from Table 11 are made only to argue for the conduct of more complete analyses which should include an assessment of the potential revenues from reforestation projects and industrial tree plantations. Indeed, while the figures presented in Table 11, which are based on survey data, indicate that the cost of reforestation approximates industrial tree plantation on a per hectare basis (when administrative and infrastructure components are unaccounted for), other parameters may also have to be considered.

On the one hand, it may be argued that establishing plantations through the private sector is more cost-effective because lower mortality rates are attained. A caveat on this, however, is the observation that most public reforestation projects tend to be located in poorer (and therefore higher mortality) sites, and usually include the planting of dipterocarp species together with fast growing species (in contrast to fast growing monoculture plantations). Intuitively, pure stands of faster growing species would yield earlier returns and, given the discounting bias, would therefore tend to be more financially attractive. However, differences in prices of various outputs may also be significant, given that the growth of hardwoods entails the need for multi-layered forests and other products such as wildlife and the like. That is, replanting of species other than those which are fast growing also needs to be conducted for a variety of reasons (including genetic diversity, etc.), and need to be investigated in terms of the trade-off entailed when higher-risk monocultures are established in tropical conditions.

Another consideration is the administrative capability of government to undertake reforestation projects. Indeed, the move to grant contract reforestation to the private sector is an attempt to improve on the constraints faced in restoring forest cover, as well as frees government for other upland development work.

Table 10
COST ESTIMATES OF ESTABLISHMENT, PROTECTION AND MAINTENANCE OF A ONE HECTARE PLANTATION, 1988

ACTIVITIES	*Cost per Hectare*		
	1st Year	*2nd Year*	*3rd Year*
A. NURSERY OPERATIONS	₱ 5,772		
Seed procurement and handling	751		
Nursery site preparation	65		
Sowing of seeds	92		
Gathering & preparation of soils	74		
Bagging of soil	267		
Potting of seedlings	426		
Preparation of potbeds and arranging pots	32		
Maintenance of seedlings	3,359		
Cost of plastic bags	528		
Cost of fertilizers at 10 gram/ seedling	178		
B. PLANTATIONS ESTABLISHMENT	₱ 4,378		
Detailed survey & mapping	1		
Site preparation	2,848		
Transport of seedlings	606		
Planting	923		
C. MAINTENANCE & PROTECTION	₱ 1,537	₱ 1,556	₱ 830
Plantation maintenance	808	808	808
Greenbreak construction	60	—	—
Footpath construction	129	—	—
Replanting	—	185	—
Patrol work	—	23	—
Fertilizer requirements	540	540	—
D. SUPERVISION & ADMINISTRATION	₱ 1,500		
E. CAPITAL OUTLAY/INFRASTRUCTURE variable (road construction, bunkhouse, lookout-tower	₱ 3,600		
F. INFRASTRUCTURE MAINTENANCE		₱ 400	₱ 400
TOTAL COST PER HECTARE	₱16,787	₱ 1,956	₱1,230

Source: Forest Resources Management Bureau, DENR.

Table 11
COMPARISON OF AVERAGE COST IN REFORESTATION PROJECTS AND PLANTATION FOREST MANAGEMENT IN 1985
(In Current Prices)

ITEM	*REFORESTATION*	*PLANTATION*	
		Moluccan Sau	*Yemane*
	Pesos per Hectare		
A. Nursery/Operation and plantation establishment	1,630	3,172	2,773
B. Plantation maintenance	1,759	1,842[a]	1,136[a]
C. Overhead	690	361[a]	361[a]
TOTAL	4,080	5,375	4,269

[a] For the first year only. Lower maintenance and overhead costs are incurred after the first year.

Source: Cruz and Tolentino (1987), Table 9, p. 106, in equivalent 1978 prices.

7. *Conclusions*

For private users of natural stands and industrial tree plantations for commercial purposes, forest management is a worthwhile undertaking. In fact, there is room for the public to increase its share from the monetary benefits of such use, in the form of higher forest charges and land rent from natural stands and tree plantations, respectively. More recent estimates based on pilot testing of the stumpage appraisal system, in fact, indicate that a minimum of ₱300 per cubic meter should be charged to cover the cost of forest renewal and existing forest charges (Revilla and Gregorio, 1986). This would result in less wasteful use of timber in the uplands, as well as minimize the potential for rent-seeking activities .

There is also room for allocating forest land for natural as well as for industrial forests. The final allocation between the two types of commercial activities should be determined in terms of the economic returns and other criteria, such as links with wood processing, ecological aspects, and the like.

II. Social Forestry: The Communal Tree Farming Component

The Integrated Social Forestry Program (ISFP) which was set up in 1982 integrates the various programs tried out for enlisting the participation of upland-based communities in forest renewal activities. One such component is communal tree farming (CTF), which was initiated in 1979, as an improvement over the earlier approaches of merely employing forest occupants in reforestation projects or granting them forest occupancy permits for a period of two years. CTF allows organizations of upland farmers to use forest lands for a period of twenty-five years, provided tree farming activities are instituted. In practice, farmers parcel out the land into individually managed units for implementation of CTF project prescriptions.

We examined the communal tree farming component of social forestry by conducting a survey on various communal tree farming projects all over the country. Nine project sites were covered and 147 farmers were interviewed. An attempt was made to include all types of projects according to performance. Indicators of success were devised according to BFD criteria, sites accordingly selected, and farmers randomly sampled.

1. *Importance of Labor in Upland Farming*

The average production costs in communal tree farming amounted to ₱2,765 per farm during cropyear 1984-85, most of which was borne by the farmer (Table 12).

The costs borne by the Forest Management Bureau (then the Bureau of Forest Development, or BFD) amounted to only ₱517 per farmer for the cropyear, or only 20 percent of total cost. The major expense item was labor cost including hired, unpaid family, and exchange labor, all of which accounted for about 64 percent of total cost. It should be noted that this study, attempted to price all inputs that went into communal tree farming. Indeed, upland farming , whether under the traditional system of slash-and-burn, or the conservation-oriented system under CTF projects has largely been labor-using.

2. *Non-viability of Income from Communal Tree Farming*

Given that labor is the most important factor input in communal tree farming, it is important to note that upland farming families cannot be expected to rely solely on CTF projects for livelihood. Table 13 shows that the return over cash expenses amount to only ₱550 for one year, which is way below the poverty line. If both imputed income (which includes the value of farm products consumed by the household) and unpaid labor (which is contributed largely by the household) are accounted for, the return over total

Table 12
COST OF PRODUCTION IN COMMUNAL TREE FARMS, CROPYEAR 1984-85

ITEM	*VALUE IN 1985 (in current prices)*	*%*
I. Costs borne by Farmers	₱2,248.1	81.3
A. Cash Farm Expenses	₱267.8	9.7
1. Commercial fertilizer bought	70.1	2.5
2. Pesticides bought	5.6	.2
3. Seeds/seedlings bought	35.0	1.3
4. Hired labor	157.0	5.7
B. Non-Cash Farm Exenses	1,980.4	71.6
1. Seeds/seedlings from		
a. farmer	328.0	11.9
b. others	38.0	1.4
2. Unpaid family labor	1,566.9	56.7
3. Exchange labor	47.5	1.7
II. Costs borne by BFD	₱517.2	18.7
1. Commercial fertilizer fromBFD/MHS	5.2	.2
2. Pesticides	0.2	-
3. Seeds/seedlings	324.1	11.7
4. Salary and TEV of technician	187.8	6.8
TOTAL	₱2,765.30	100.0

Source: Corpuz, E.B. et.al. (1987), various tables.

Table 13
NET GAIN FROM COMMUNAL TREE FARMING (June 1984-May 1985, In Current Prices)

ITEM	*PER FARM (₱)*	*PER HECTARE (₱)*
Cash income	818	843
Cash costs	268	240
Return above cash costs	550	603
Non-cash income	726	691
Non-cash costs	2016	1931
Return above non-cash costs	1290	(1240)
Total income	1544	1534
Total costs	2283	2170
Return above total costs\or earnings	(739)	(637)

Notes: a.) Figures in parenthesis indicate losses.
Source: Corpuz, et al. (1987), Table 29a (p. 81) and Table 33a (p. 90).

costs is less than zero. That is, whether at farm level, or on a per hectare basis, communal tree farming is not a viable project for the farmer.

The reason for this is that no income has yet been considerably generated from the tree farming component, despite the fact that CTF started as a Program some five years earlier (in 1979). Further, no formal credit, which could have augmented farmers' income, has yet been available to such farmers whose stewardship certificates are not considered sufficient loan collaterals as land titles. Thus, there is an imperative to subsidize farmers more substantially, since the major effect of the Program, i.e., conservation benefits, are also earned by society.

3. *Differences in Importance of CTF Across Sites*

Given the non-viability of communal tree farming as the sole income source for upland farmers, it is no wonder, then, that for a significant number of CTF projects, income is earned mostly from other sources. Table 14 presents cash income from all sources at the CTF projects included in the survey. Note that the projects are initially classified according to criteria which includes income, as follows: (a) successful sites, at least 60 percent of total area has been developed and income is at least ₱12,000 per annum; (b) average sites, where 40-59 percent of total area is planted with CTF crops and the value of products is less than ₱12,000 per year; and, (c) less successful sites, where no income is yet derived from CTF and the area planted is below 40 percent of the total.

Given these categories, we can glean from the data presented in Table 14 that among the successful sites, only those in Camarines Sur derive most of their income from CTF. The other sites which were categorized as successful have larger shares of income from other sources. This is, likewise, the picture for those CTF projects which were classified as average or less successful.

First, this implies that using income levels do not adequately measure the impact of communal tree farming on the project participants. Changes in income, as measured against pre-project levels would be more appropriate for measuring the impact of CTF on upland families' livelihood. (See delos Angeles, 1986a for more details).

Second, the importance of other sources of income implies the weak income generating potential of CTF relative to other activities in the area. This follows from the long gestation period before revenue can be earned from trees.

Relatedly, competition for labor between CTF and other activities may be present. To the extent that these other activities contribute to upland resource degradation but earn higher returns (such as fuelwood gathering or small-scale logging), at least in the short run, then CTF may be said to

Table 14
INCOME OF COMMUNAL TREE FARMS PARTICIPANTS, BY SOURCE
(June 1984-May 1985, In Current Prices)

Site	*Income from CTF*	*Percent of Total Income*	*Income from Other Sources*	*Percent of Total Income*
Successful Projects	₱120,477	35	₱226,414	65
Buhi,CamarinesSur	88,257		30,127	
Gen. Luna, Quezon	13,787		88,025	
B. Nuevo, Iloilo	18,433		108,262	
Average, per farmer	2,955		5,522	
Average Projects	₱73,336	16	₱380,547	84
Maasin, Leyte	8,026		54,365	
San Juan, La Union	10,658		200,630	
Nabas, Aklan	54,652		125,552	
Average, per farmer	1,322		6,919	
Less Successful Projects	₱27,751	15	₱619,233	85
Villaverde, N. Vizcaya	8,400		223,308	
Carranglan, N. Ecija	17,316		212,712	
San Remegio, Cebu	2,035		183,213	
Average, per farmer	577		12,142	
Total all sites	₱221,564	15	₱1,226,194	85
Average, per farmer	₱1,519		₱8,341	

Source: Corpuz, et. al. (1987) Table 30, p. 83.

have been unsuccessful in stabilizing forest occupancy. Hence, it is important for project managers to note the income sources of CTF participants in order to determine the extent to which CTF may help alleviate the upland population problem.

Complementary findings from a case study of a CTF Project in San Pedro, Laguna by Aguilar (1986), in fact indicate similar conclusions. In addition, the San Pedro CTF study concluded that the average area granted to CTF participants was too small to provide sufficient income, household income was derived mostly from wage employment, and project beneficiaries participated mainly to gain access to land.

4. *Conclusions*

Participation in the government's Integrated Social Forestry Program through the Communal Tree Farming Project does not seem to have resulted in marked increases in income of the beneficiaries. In fact, reliance on other income sources was evident. In particular, revenue from the tree farming component of the project has yet to be documented.

Further, the benefits of stabilized occupancy of the uplands also accrue to society, in the form of soil erosion control and its other effects. Thus, upland farmers are, in effect, conducting upland resource renewal with minimal compensation from the general public who also benefits from such renewal. It is, therefore, doubtful that such efforts are sustainable, given the more urgent needs of poor, upland farmers. Indeed, Kummer (1984) has emphasized the need to examine social forestry in terms of its ability to help "the poorest of the poor."

Considering the labor intensity of soil conservation component and the negative farm income earned during the early years of tree farming, there is a need to provide subsidy enough to allow farmers to spend time on farm investments for resource renewal. Further, given that society also benefits from the conservation of soil resources and the restoration of timber to forest lands, such subsidy should be interpreted as due compensation paid to the farmers for their labor input in activities which conserve upland resources.

III. Concluding Remarks

We have seen that different types of users of upland resources derive various benefits from their respective activities and face different constraints in production. For those in commercial forestry, capital expenditures have been prominent while payments for land and timber resources were minimal. By and large, for those who have access to financial resources, the management of natural forest stands or industrial tree plantations is a profitable venture. In fact, government should improve the fee system applied to these users, since there is room for extracting a higher public share of revenue from commercial timber production. Correct pricing of stumpage and land rent, would, in addition, encourage higher efficiency in the use of scarce timber and land resources.

With respect to social forestry, however, the communal tree farming study indicates the need for more support from government. CTF is not viable, as a sole income-source for participating farmers, at least not during the gestation period of tree crops. Given that upland resource activities such as tree farming and building of erosion-preventing structure are labor intensive, there is a strong likelihood that farmers would spend more time on activities which generate income. Thus, cooperators should be subsidized more than current levels, at least up to the time when income from the communal tree farm becomes viable. Further, since the benefits of resource conservation do not accrue to the upland farmers alone, such subsidy should take the form of compensation made by society to those who sustain resource renewal activities.

In conclusion, efforts which seek to enlist the participation of various users of upland resources such as loggers and upland farmers should address the following components: (a) the opportunity cost of complementary inputs used in resource use, (b) the future benefits that are derived from on-site resource conservation, in terms of preserved or restored soil productivity as well as the future benefits that are derived from tree crops, and (c) the off-site benefits that are earned by other sectors of society due to the abatement of erosion (delos Angeles, 1986b).

Appendix Table 1.1
COST ESTIMATES FOR NATURAL FOREST STANDS, 1985
(In Current Prices)

ITEM	Cost per Hectare (₱) First Cyclic Cut	Second Cyclic Cut
A. Pre-logging Operation	6,224	2,616
B. Harvesting Operation	27,764	19,594
C. Post Harvest Operation	1,241	952
D. Overhead Cost	11,572	8,864
E. Forest Protection Cost	1,449	1,449
Total[a]	48,680	32,862

[a] Totals may not add up due to rounding.
Source: Cruz and Tolentino (1987), Table 25, p. 66.

Appendix Table 2.1
COST OF INPUTS IN A NATURAL FOREST STAND, 1980

ACTIVITY/ITEM	COST (in current pesos)				
	Labor	Fuel & Oil	Spare Parts	Overhead	Total
A. Pre-logging	10,411	37,958	75,632	26,057	150,058
B. Harvesting per cu.m.	18	24	69	37	148
C. Post-harvest	46	none	62	12	119

Source: Cruz, 1982.

Appendix Table 3.1
STUMPAGE VALUE DETERMINATION FOR NATURAL FOREST STANDS, 1985
(In Constant 1978 Prices)

3a. Stumpage Value Computations 30% Profit and Risk Margins	*Area A*	*Area B*
Price per cubic meter	₱283.6	₱283.6
Less cost, per cubic meter:		
a. Harvesting	90.6	69.7
1. Road survey and setting lay out	1.8	1.4
2. Road construction	18.7	8.0
3. Felling and bucking	2.8	1.6
4. Minor transport	18.9	22.4
5. Major transport	47.1	35.7
6. Scaling	1.3	0.6
b. Overhead	36.6	19.9
c. Margin for profit and risk (30% of a + b)	38.1	26.9
Stumpage value	₱118.3	₱167.1

3b. Profit and risk computations; ₱8.50 stumpage value[b]	*Area A*	*Area B*
Price per cubic meter	₱283.6	₱283.6
Less: a. Harvest cost	90.6	69.7
b. Overhead cost	36.6	19.9
c. Profit and risk margins	116%	207%
Stumpage value, per cu.m.	8.5	8.5

[a] Stumpage price = log market price
- harvest cost
- overhead cost
- (% profit & risk margins) x harvest + overhead costs)

[b] A forest charge of ₱30/cu.m. in 1985 is equivalent to ₱8.5/cu.m. in 1978 prices.

Notes: Figures in Table 1 were expressed in per unit cubic meter using a division of 114.8 cu.m./ha. and 144.1/cu.m./ha. for areas A and B, respectively.

Source of basic data: Cruz & Tolentino (1987), Table 26, p. 68.

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