ECONOMIC vs. FINANCIAL PRICING OF TIMBER AND ITS PROBABLE IMPACT ON NATIONAL ACCOUNTS: THE COSTA RICAN CASE 1980-1992

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I.- INTRODUCTION

For a long time now, developing countries have practiced timber pricing policies that undervalue their tropical timber resources. Inevitably, such policies will come to threaten the long-term survival of the sector. They encourage waste, industrial inefficiency and an absolute disregard for sustainable management of tropical timber resources. Costa Rica is clearly no exception to such domestic pricing policies.

Because of this threat to the sector, natural resource economists have focused much of their attention in recent times on developing more accurate methods for assessing the value of "tropical rain forest resources." They have devoted efforts to identifying non-timber forest products, estimating their value correctly, and incorporating other environmental externalities. When all this is added to the value of extracted timber, the result will presumably give the true total value of tropical forest production in terms of costs and benefits. Recent studies clearly point in this direction (McNeely 1988, Panayotou 1992 and 1993, Muul 1994 and Godoy 1993).

Many ecological eocnomists defend this comprehensive approach to assessing the full value of the forest, as a response to the problem of low selling value for marketable products of the tropical rain forest. This is based on the popular argument that classical economic thought has very little to contribute to the kind of analysis oriented toward ecological economics.

It is our contention that traditional price analysis in fact has much to offer to ecological economics, and that traditional economic analysis is indeed relevant to the issue of sustainable management of the tropical rain forest. The destruction of rain forests over the past quarter-century, we believe, can be attributed in good measure to "perverse" pricing policies at the local level.

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Ecological economists have generally tended to blame a number of environmentally related issues for destroying the tropical rain forest ecosystem. They have downplayed or outright overlooked the impact of "appropriate" prices as the most powerful motivator of economic activities whenever normal human beings are faced with decisions.

By contrast, forest economists and agricultural economists feel that traditional price policies in developing countries have worked against forest production, instead favoring agricultural and livestock production activities in the region. Such price distortions, they feel, have decimated the area's natural resource base, including the forest.

These positions have come increasingly into conflict, and it can no longer be denied that traditional economics and ecological economics have failed to blend their views into a useful new body of analysis. Only such a composite analysis can possibly provide powerful clues as to why Latin American tropical forests have continued to suffer from relentless wasteful destruction over the past 50 years, and why the full contribution of forests to national income has been so profoundly underestimated (CCT/WRI,1991).

Traditional price policies have consistently undervalued forest resources and have provided an erroneous picture of the real importance of the forest sector and its contribution to the economies of tropical nations. Such perverse policies have systematically undermined the sector's ability to play the economic and environmental role it certainly deserves.

This paper will argue that there is a pressing need for better pricing systems on timber resources and more complete knowledge of price trends for major timber products. This need exists regardless of whether externalities are handled properly or non-timber products from the tropical forest are identified and accounted for. More accurate pricing systems and more complete information are the only way to guarantee better resource allocation among the members of the region's traditional agricultural sector, which normally includes the forest sector.

If timber and other natural goods and services from the forest are priced appropriately, the foundations will be in place for a major policy dialogue among sectors. The forestry sector will finally play the economic role it truly deserves, because the real dimension of its contributions will be understood, accounted for and taken into consideration when major economic policy decisions are made.

Economic pricing means that timber resources are valued at their economic, shadow or border price. This corrects the imperfection traditionally found in national income accounting, based as it is on a market price. Also known as the financial price, the figure used in national accounts is normally well below economic world market prices for timber due to multiple local imperfections and subject to major distortions. This traditional method never really reveals or arrives at the "true" economic value of the tropical rain forest's total contribution to society. Such distortions need to be eliminated or reduced significantly.

II.- OBJECTIVES OF THE STUDY

1. To evaluate the general trends of relative reported world timber prices and compare them with domestic price movements; and to examine the impact of these price trends on local economic prices of timber over the long term.

2. To ascertain how economic pricing affects the value of total timber production, and gauge the implications of this pricing method for forest sector accounts, gross agricultural output, and the overall book value of forested lands and their contribution to Costa Rican society.

III.- HYPOTHESES OF THE STUDY

The study is based on the following general hypotheses:

a. The use of economic prices instead of financial prices for assessing the value of timber resources in the tropical rain forest has been very detrimental because it understates the role of the forest sector as a share of the total agricultural sector and national accounts, as well as the total estimated value of acreage in tropical rain forests.

b. Relative prices, nominal protection rates, levels of subsidies and intersectoral transfers all serve as good indicators of the negative impact that traditional price policies have had on the underdeveloped tropical countries and are useful for measuring the perversity of such price policies.

IV.- SUMMARY OF THE METHODOLOGY

The study consisted of four major steps:

a. The first step was to estimate relative timber prices and probable long-term price trends. A price index was developed and analyzed, taking 1990 as the base year, to evaluate the

behavior of relative world prices for timber and compare them to prices of major tropical commodities.

b. The economic prices of timber needed to gauged, along with their overall impact on the sector. Nominal protection rates and levels of subsidies and transfers were estimated, and the results were used to recalculate sector accounts based on economic prices and total intersectoral transfers.

c. The total macroeconomic value of the tropical rain forest needed to be estimated. Major timber and non-timber products had to be included in figures on total value of tropical forest acreage, along with the financial and economic prices of average production from the tropical rain forest and a preliminary estimate of the macroeconomic value of tropical forest acreage.

d. The results of each of these three analytical processes were then woven into a draft policy framework for forests. It was thus possible to judge the major implications that economic pricing and accurate valuation of tropical forest acreage will have in designing a forest policy that can make a positive contribution to sustainable use of tropical forest resources.

V.- RESULTS OF THE STUDY

V.1.- RELATIVE PRICE BEHAVIOR AND FORESEEABLE TRENDS

The concept of relative prices has been widely used by economists for many years to justify resource allocation practices that favor a given commodity and castigate others. This system has fueled the unrelenting standoff between environmentalists and livestock producers.

Environmentalists attribute deforestation to four kinds of policy supports that have been lavished upon the livestock sector:

a. International credit support from multilateral and bilateral agencies, with the understanding that land improvement included removal of the forest to establish pastures.

b. Subsidized interest rates, which have often favored agricultural and livestock activities over the forest sector and allocated short-term resources to activities amply proven to lack long-term economic viability.

c. Land settlement policies that promoted the occupation and development of lands suited only for forest cover, while the best farm land generally remained in the hands of large land holders, and the true production potential of frontier lands was overlooked.

d. Agricultural development policies based on the assumption that the agricultural frontier was essentially inexhaustible.

Environmentalists have been correct in wielding these arguments. In fact, in some countries, such practices continue to be a part of current agricultural policies. However, an additional argument needs to be included:

e. Relative prices, by castigating timber products in favor of other tropical products, have depressed productivity in areas that are already developed, accelerating the expansion of the agricultural frontier into areas clearly suited for forest use only.

The first four arguments have been widely covered in the environmental literature and to a great extent, although indirectly, in the newly emerging material on ecological economics. However, a search of the literature reveals that the relative price argument has hardly been used at all to explain the ecological degradation of tropical rain forests today.

Despite the paucity of attention it has received, the relative price argument might actually have been the accelerator driving the rapid transition from forest to pasture that has swept the tropical world, particularly in Costa Rica.

Table 1 shows absolute and relative price trends over time for some of the major tropical commodities. It is clear that until the early 1980's, timber maintained relatively lower prices than the other commodities. The relative prices given in Table 2 reinforce this perception and confirm our suspicions.

The argument needs to be even further refined. The price of timber is reported in three categories: meranti logs, sapele logs and sawn wood. These relative prices can be calculated and matched against the weighted relative price indices of coffee, cocoa, sugar, beef, bananas, oranges and African palm, which continue to compete with timber for land use in the American tropics. Such a comparison shows that the relationship has changed, with prices now moving in favor of timber. The trend toward timber and against crops and livestock can be expected to continue indefinitely (see Table 2).

World Bank data paint a clear picture for the coming decade. If expectations are borne out, sustainable exploitation of the tropical rain forest will certainly become a very attractive option for individual investors and for overall society. This global movement will probably extend to Costa Rica, where the very evident trend all over the country is to abandon pasture lands to their biological destiny -- secondary forest.

Such new developments are already in evidence in tropical rain forest areas on the Atlantic coast, where major livestock production activities flourished over the past 25 years. Aguirre (1995) recently completed a survey, and although findings are still being processed, preliminary figures indicate that extensive tropical beef ranching is being abandoned in favor of "secondary forest growth." Equally significant, out of a sample of 40 farms that still have substantial forest resources, nearly 84 percent of those interviewed claimed that, had they foreseen the collapse of beef prices, they would have left intact at least 40 to 60 percent of the land they now have under pasture.

Another clear sign of the back-transition, which sees pasture reverting to forest, is the outcry among Costa Rican beef producers in recent months, demanding full-scale economic support in the form of subsidized credit and other inputs, and technical assistance. These subsidies had passed into history on the heels of structural adjustment negotiations with the World Bank and IDB, but producer groups now claim they are necessary for the survival of livestock activities. Incidentally, these are the same policies that were loudly acclaimed in the past.

Findings coming in from current surveys indeed confirm this trend, with relative prices moving against the livestock sector. Local beef producers are beginning to feel the price pinch and are seriously considering abandoning the activity, at least on less profitable marginal lands. Given present world beef price conditions, as well as absolute and relative price prospects for the foreseeable long term, the production of beef and some other traditional tropical products has ceased to be attractive.

With world prices for the diferent forms of timber on the rise, economic, shadow or border prices for these commodities will almost certainly maintain their current high levels. There is even a very strong possibility that they will continue to climb, pushing up local timber prices (Aguirre,1993).

Supply shortages now seem to loom on the horizon, as demand for timber attempts to keep pace with the needs of a growing population and rising income levels in tropical timber-producing countries and the developed world. A recent study placed population growth and a rising per-capita income base on a partial equilibrium model with the demand for timber in Costa Rica. If the results are to be believed, future demand for hardwood in the country will be a direct function of the timber needs of this ever-larger population.

Domestic prices will soon have to be adjusted to reflect a rising world price for timber and the population and income growth being experienced by Costa Rica. This will definitely improve the long-term position of the forest sector in the local economy,

particularly boosting the profitability of investments in sustainable forest production. Indeed, at least a half-dozen new NGO's in the area now offer technical assistance in sustainable management of the humid and dry tropical rain forest.

V.2.- IMPACT OF ECONOMIC PRICES IN MACRO ACCOUNTS OF THE FORESTRY SUB-SECTOR AND IMPLICATIONS FOR AGRICULTURAL SECTOR ACCOUNTS

Costa Rican timber has traditionally been sold as a cheap commodity by comparison with world timber. A recent study conducted at CATIE (Aguirre, 1993) clearly showed that even though prices for local industrial-use logs had risen sharply in the past five years, they were still far below comparable world prices.

One indicator that domestic timber prices are indeed on the rise is the booming demand for "structural steel beams" in a construction industry that only a few years ago still depended heavily on timber. A simple poll of steel beam wholesalers in the city of San Jose revealed that sales of these structural steel beams had increased by almost 41 percent from 1990 to 1993.

Many local timber wholesalers will in fact argue, not that local prices have risen sharply, but that they will continue to lag behind unless "international economic prices" are used as a guide for pricing local timber. Some analysts assert that present imperfections in the timber market stand as a clear barrier, preventing local timber producers from receiving more realistic remuneration, and thus fostering unsustainable management practices in the tropical rain forests of Costa Rica (Stewart, 1994).

Major timber processors show no sign of abandoning their long-standing argument that barriers to the free local and international trade of logs have preserved the Costa Rican tropical rain forest and warded off a collapse of the local timber industry. Even if present policies continue, however, prices will in all likelihood continue to climb, and to the dismay of many, the rapid disappearance of local tropical rain forest acreage continues unabated.

For many years, the forest sector has been faced with numerous legal and "technical" arguments to prevent the free trade of many forms of forest products. However, in view of the rapid disappearance of tropical rain forests over the past 25 years, it is clear that cheap local wood has in fact promoted the destruction of the tropical rain forest. Many species that have now come into use were once wantonly destroyed and burned through the early use of highly selective logging practices. If they could have been saved from wasteful loss, probably the country would be in a better position today.

Several major problems make it very difficult to evaluate the performance of the forestry sector. First, there is very little statistical material, particularly information on local prices, for reasons that are well known but are not of interest for the purposes of this paper. Second, timber is used for two major purposes: industry and charcoal manufacture. These two sectors carry different relative weights in determining the real average local price for timber products of the tropical rain forest.

The shortage of price information was approached in two ways. The total value of production in current-value *colones* for the forest sector was obtained from the National Accounts Section of the Central Bank. Figures on total local wood production in cubic meters were compiled from the General Forestry Division of the Ministry of Natural Resources, Mines and Energy and FAO/Forest Statistics.

The gross production series was then divided by the production value series, giving the "local imputed price of total timber produced, per cubic meter." This was divided by the "average current exchange rate" reported by the Central Bank, to offset the effects of inflation. The imputed value per cubic meter was used as a proxy for the national average price of a cubic meter of timber for all uses. As can be seen in Table 3, the price level in dollar terms never rose above US$12.00 over the last decade, even though economic prices went as high as US$82.00 in 1990.

It is certainly true that such a wide gap between local prices and world prices provides no incentive to care for this poorly remunerated resource. Table 4 shows what would have happened to the total value of the forestry subsector's output if the country's total production were valued at "world," shadow or economic prices. As can be seen, at financial prices, the sector's share of total output climaxed in 1991 at a bare 5.8 percent; but at economic prices, the result the same year was an astonishing 24.5 percent.

The result of such a situation is known as the nominal protection rate, or transfers from timber producers to the rest of society, in the form of prices. From 1980 to 1992, the figure ranged between -81 and -89 (see Table 5).

Incidentally, these negative rates are also two or three times greater in magnitude than those of other products, particularly basic grains (Salazar et al, 1993). This clearly reveals that the forestry sector is at a great disadvantage compared with other agricultural sub-sectors of the economy during the last decade.

The implications of all this are inescapable. A sector that has negligible macroeconomic clout receives very little attention in

policy dialogues and in decision-making circles. This, coupled with the effect of low local financial prices and a notoriously imperfect market setting, will always prevent the sector from living up to its full economic potential. Sustainable forest management will remain elusive. If the sector were able to show its muscle in national accounts, it would have a far different degree of participation in the processes that shape its policy environment.

Because of its lightweight role in the economy, the forestry sector has rarely been invited to participate in policy arguments. One of the results of this is the environmental degradation that the country is now experiencing. Severely lopsided development plans have inevitably emerged from decision-making processes that separate forestry from other policy debates, particularly agriculture, overlooking the environmental interplays that are well known to ecologists.

However, it is not enough merely to incorporate forests into the sectoral policy debate. A new, more holistic approach is needed. All the material cited above clearly reveals that the true value of timber resources has gone unrecognized during the last decade. The material coming out of ITTO resoundingly upholds the importance of a holistic approach and a more accurate assessment of true resource value (ITTO, 1994).

Any new policy dialogue will have to integrate all sectors of human economic activity if there is to be any hope of solving our pressing environmental problems in coming years. In the future, the concepts of human and natural capital will have to be treated as one and dealt with accordingly.

V.3.- ECONOMIC PRICES AND CROSS-SECTORAL SUBSIDIES

Developing nations have discovered a number of "perverse" economic policies for transferring resources from one sector to another, and Costa Rica is certainly no exception. We have already seen a discussion of subsidies in the form of highly negative protection rates. These were exacerbated by foreign exchange policies under which the currency was subjected to regular devaluations as a normal procedure to improve the country's short-term competitive position in agriculture and livestock and to promote the small number of industrial products targeted under the famous import substitution models of the 1960s and 1970s.

Under these devaluations, products with little export potential became even less attractive. Forest producers no longer had any incentive to care for tropical rain forests, and local timber production offered very few rewards. At the same time, macro-economic policies were offering artificially high gains in exchange

for destroying the rain forest and converting it to pasture or pressing it into use for other traditional tropical exports, such as African palm and cocoa.

Although available information is incomplete, there is enough data to perform preliminary calculations of transfers and subsidies from the forest subsector to the rest of the economy. The results can be seen in Table 6. These transfers and subsidies grew from 1.2 billion *colones* in 1980 to 28.0 billion *colones* in 1991, or from 354 *colones* per cubic meter in 1980 to 6103 *colones* per cubic meter in 1991.

Costa Rica is now engaged in a country-wide campaign to maintain its forest and provide a sustainable environment for future generations. The present government administration has put forward an innovative proposal to sell carbon emission rights to developed countries as a way to finance this important, worthwhile effort.

Many feel that, while this proposal is undeniably important and interesting, it misses the point. It transfers responsibility outside, while failing to address the needs of Costa Rica's forests, forest dwellers and producers. This sector has transferred much wealth over the past decade, receiving low prices for its timber and thereby subsidizing the rest of the national economy. The new proposals make no allowance for the rights of this sector.

If the goverment of Costa Rica is able to sell emission rights as proposed, the country's 1994 earnings will total aproximately US$100 million or around 15.5 billion *colones* a year. This is equal to nearly half the 1992 subsidies. If society were to decide instead to pay the economic price of timber, a new era of sustainability for the Costa Rican forest could well be financed domestically.

In any event, a high price on wood for local use would probably deter present patterns of wastage and destruction and encourage better management of the country's forest. All parties would benefit.

The argument that higher prices will simply accelerate the destruction of the forest appears ingenuous. In fact, rational economic agents do not plunder a valuable resource for short-term gain, when a program of sustainable forest management would shore up attractive long-term opportunities to earn income repeatedly from the same resource.

The argument that high prices trigger deforestation certainly is not borne out by farm surveys currently being taken. Instead, the prevailing argument appears to be entirely different. Even

livestock producers whose farms preserve little or no remaining forest are thinking of abandoning the less productive areas, letting them revert to "nature" and be taken over by secondary forest growth. For the first time, they are eyeing the special treatment now given artficially reforested lands, asking that these same benefits be extended to secondary growth forest.

This trend has received even greater momentum as markets open for secondary forest species, which are now actually preferred in many cases, due to their rapid growth. In this new setting, many will be forced to rethink their attitudes toward the "forest," seeing its economic potential from a new economic and technical perspective.

V.4.- ECONOMIC PRICING AND VALUATION OF THE MACRO-FOREST: FOREWORD

In coming years, the move to price timber more appropriately will begin to converge with new activities based on extraction of other products from the tropical rain forest. This will give a whole new understanding of what an acre of forest is really worth and awaken new interest in planting trees.

A number of studies have already been published on assigning a more accurate value to the forest, so as to account for the macro and micro values of different forest products (Panayotou,1992; Godoy,1993). The World Bank (1993) recently completed a study in Costa Rica, combining local data with figures from other parts of the tropical world, and placed the real value of a hectare of tropical forest in the country at over US$2000.

CATIE is now reviewing these figures, based primarily on the results of its own local work (Aguirre,1994). Although the figures differ somewhat from World Bank numbers, preliminary findings of both studies clearly indicate that the "total value" of an average hectare of tropical rain forest is far higher than it was considered in the past. In fact, in many cases, the forest was assigned a value of zero in order to justify the removal of forest cover in favor of other economic activities on land whose only ecologically sound use would have been forest.

Table 7 shows results obtained at CATIE, based on preliminary calculations, and showing "flow values" rather than stock. This distinction is important to remember when evaluating the full dimension of the forest's real contribution to gross national product.

Based on financial pricing, the total flow value of a hectare of tropical rain forest was estimated at around US$240.50 per year in constant 1990 dollars. Calculations based on economic pricing assign a social value of US$826.32, or 2.43 times more, to the same hectare. These figures compete very favorably with many of the

non-forest uses currently being given to the land, particularly commercial beef production.

Another important conclusion can be drawn from this analysis. If figures are based on economic prices, timber production as a share of the total value of the forest rises from 16.33 percent to 75.65 percent. Such figures make the idea of sustainable forest management even more appealing.

A 1992 study asked how much it might cost to preserve the country's biodiversity. The result? An estimated US$996.5 million over a 10-year period, or approximately US$99.5 million every year (INBIO,1992). We can use this figure as the total cost of preserving the remaining 1.3 million hectares in sustainable condition, and express it in per-hectare terms as US$76.53 a year per hectare. This amount can be roughly covered by the revenue from selling carbon emission rights, if present attempts should materialize. The remaining benefits would remain as "ecological/ economic" profit to society.

The real problem is that the benefits accrued to society are of little interest to individual timber producers and to the forest dwellers who, in the final analysis, are entrusted with keeping up and managing the tropical rain forest. Unless society is willing make sure the social benefits are spread equitably, these people will have no incentive to practice sustainable forest management.

V.5.- IMPLICATIONS OF FORESTRY AND ENVIRONMENTAL POLICY DESIGN

Sustainable forest management can become a reality only if appropriate policies are identified and implemented. However, "hard economic facts" are necessary if such political decisions are ever to be made. Society at large and politicians in particular need to be convinced that such policies are in the best interest of society, particularly in times of serious economic and ecological hardship.

This section has been divided into four policy arguments that need to be addressed if "sustainable management of the forest" is to become a vital part of the economic discourse.

V.5.1. - Price trends and resource allocations: timber vs. other activities

Evidence already gathered clearly shows a future in which a number of ecónomic forces will converge so that the sustainable production of wood for all uses will become an excellent business opportunity. For individual investors and society as a whole, private and public resources invested in the sustainable use and management of forests will be highly profitable in the medium and long term.

If this is true, credit and investment policies for the forestry sector need to come under close scrutiny, taking into consideration the sector's diverse economic contributions. Particularly critical are policies that encourage both agricultural producers and urban dwellers to combine forest production with other activities. Each different activity needs to become an integral factor in the farm's cash flow, so that the final outcome will be attractive to timber producers and forest dwellers.

Forest product marketing also needs attention, because of current expectations for improved price conditions. Markets need to be properly organized and structured so that the benefits of higher prices and more accurate value assessment will be distributed equitably and sustainably, particularly among small-scale owners and forest dwellers. Production and conservation need not be antagonistic.

V.5.2.- Raise the sector's profile in the policy dialogue

If predictions of economic renaissance in the forest sector are borne out, the sector will need to play an active role in the general agricultural policy dialogue. This holds many implications, such as coordinating studies, engaging in the policy debate, and the participation of both public and private actors.

Traditional policy design practices center the dialogue around agricultural activities. This is no longer "sustainable." If the forest sector continues to be isolated from national and sectoral policy debate, conflicts over land and water use and the degradation of renewable resources will be inevitable.

Policy forums for the agricultural sector will need to be all-inclusive, particularly as the forest becomes a major contributor to economic and environmental stability for Costa Rican society. Separate forums are neither practical nor acceptable over the long term, if sustainable policies are in fact a goal for the future.

V.5.3.- Comprehensive assessment of forest acreage

If more accurate values are attributed to forest land, reflecting its full production potential, many issues will come into clearer focus:

- -Sustainability of timber resources: this would include measures and organizations to make sure that technical and economic measurements are taken into consideration, thus guaranteeing that all benefits are accounted for and equitably distributed.

-A careful balance of conservation and production: all production processes will have to include conservation measures as part of their investment plans, and consider these measures as valid medium- and long-term operating costs. Short-term lending policies will need to be reworked to guarantee that these activities are included in the regular portfolio of the banking system.

-Other non-timber activities: the forest ecosystem is now recognized as a source of water, foreign exchange, pharmaceuticals, carbon fixing, and wild plants and animals for domestication and for educational and anthropological uses. These will all have to be counted as valid economic activities, and private and public resources allocated for developing them.

V.5.4.- Appropriating social benefits to private holders

Much of the benefit of the forest is of a social nature. However, it is the individual producers who, in the final analysis, must care for the resource, and they need to see that they have a share in the benefits. Mechanisms will need to be developed to create subsidies and introduce transfers from other sectors benefiting from the preservation and survival of the forest. Those who reap the rewards of the tropical ecosystem will need to understand this situation.

The way things are, it is difficult to imagine that producers and dwellers of the forest will maintain favorable attitudes toward sustainability unless they see a direct short-term benefit for themselves aside from long-term benefits to society.

V.5.5.- Agroforestry: a contribution to sustainable development

The new appreaciation of the value of trees, in our opinion, will extend beyond the forest. Over the past 40 years, CATIE has conducted extensive research on the role of agroforestry systems in developing sustainable agricultural systems, particularly for small farmers. Recent research has shown that trees can provide enough nutrients to small-scale basic grain production to save the country some US$38.80 per hectare. If trees were added to only half the area presently sown to corn and beans, the production process would benefit from billions of *colones* in nutrients obtained naturally (Dominique et al, 1995).

None of these promises will materialize, however, unless the value of trees is redefined, both as particular individuals or species, and in general, because of their capacity to generate wealth for

the society of developing countries. Much can be achieved if ways are found for trees to make these and other kinds of contributions to the welfare of society. We need new ways of looking at trees and their contribution to human welfare.

V.5.6.- Economic or financial pricing? Subsidies, distortions and possible solutions

The producers and dwellers of the forests have transferred substantial resources to other sectors of society. Such distortions will have to fade into the past if our new goals are ever to be met:

a) Timber marketing policies will have to be revised, and the perspective of sustainability will have to be maintained in an open market, without forgetting the concept of economic pricing and the benefits that such market policies can bring to all parties.

b) Current local marketing mechanisms need to be reassessed to ensure competitevenes and equitable distribution of economic benefits.

c) Possibilities need to be explored for replacing other products with forests, as prices move in favor of timber products and against traditional agricultural and livestock activities. Tradition will have to be reconsidered and secondary forest will have to be addressed as a research and policy issue, seen particularly as an appropriate land use in areas where primary forests should have never been removed in the first place.

VI.- PRELIMINARY CONCLUSIONS

The direct implications of such findings appear to be:

- It is highly unlikely that anyone will be motivated to care for or manage a resource that is so undervalued, whether for immediate use or future benefits, particularly in the case of an investment as slow to mature as a forest.

- There is a clear need to profoundly rethink trade and commerce policies for the Costa Rican forest sector.

- If economic pricing had been used in macro-statistics on the agricultural sector, the forest sector would almost certainly have had a much stronger voice in economic policy arguments that have affected the sector over the past five years.

- Easily adaptable economic mechanisms will have to be developed to reflect the macroeconomic and sectoral externalities of natural

resources. Macroeconomists will not readily translate a long involved process with a strictly ecological orientation into the national accounting system.

- No assessment of externalities could have counteracted the initial miscalculations, based on what appears to be a real underpricing of timber resources.

- Economic pricing would have so improved economic returns for local timber producers, that they would have refrained from clearing at least part of the land on their farms, particularly the areas suitable only for forest.

- A comprehensive policy dialogue must embrace the agricultural sector and address development issues of interest to foresters. Only then can the forest sector guarantee sustainable production and medium- and long-term contributions to the environment.

- The role of trees will have to be reassessed from a holistic standpoint if true ecosystem management concepts are to emerge, allowing production and conservation to live together in harmony.

Finally, it is important to understand that all other arguments about production and economic contributions of non-timber products from the forest are probably of "social interest" only. They contain little convincing information about "real" benefits for the owners of forest lands, on whose shoulders ultimately rests the sustainable use of the resource, with all its implications.

"Real pricing means real money" that can be had almost immediately. This is language that farmers of all sizes, conditions and ethnic origins can easily understand. "Real economic prices" will buy the time needed for developing sustainable technologies that are needed for real, long-term conservation of the forest.

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TABLE 1 COMMODITY PRICES,PRICES PROJECTIONS AND RELATIVE PRICES.
PERIOD 1970/2005
UNITS UNITS PRICES AND INDEX PRICES
BASE 1990

YEAR	BEEF CENTS/KGS	PRICE INDEX BEEF	BANANAS $mt	PRICE INDEX BANANAS	AFRICAN PALM $mt	PRICE INDEX AFRPALOIL	LOGS MERANTI $cu mt	PRICE INDEX LOGS/MER	LOGS SAPELLI $cu mt	PRICE INDEX LOGS/SAP	SAWNWOOD $cu mt	PRICE INDEX SAWNWOOD
1970	520	203	659	122	1037	358	148	84	171	50	370	71
1980	384	150	527	97	811	280	271	153	350	102	507	97
1985	314	123	551	102	730	252	199	112	253	74	403	77
1989	271	106	578	107	370	128	201	114	289	84	446	85
1990	256	100	541	100	290	100	177	100	344	100	524	100
1991	260	102	547	101	332	114	196	111	309	90	462	88
1992	230	90	444	82	369	127	196	111	311	90	481	92
1993	244	95	413	76	352	121	364	206	290	84	502	96
1994	235	92	408	75	358	123	280	158	293	85	514	98
1995	231	90	397	73	334	115	289	163	298	87	517	99
1996	228	89	426	79	307	106	298	168	302	88	523	100
2000	274	107	409	76	304	105	303	171	326	95	545	104
2005	262	102	401	74	267	92	320	181	361	105	572	109

SOURCE:PREPARED BY THE AUTHOR FROM WORLD BANK DATA.

TABLE 2 RELATIVE PRICES OF TIMBER VIS-A-VIS OTHER MAJOR COMMODITIES
PERIOD 1970/2005
UNITS UNITS PRICES AND INDEX PRICES

YEAR	BEEF/TIMBER			BANANAS/TIMBER			AFRICAN PALM OIL/TIMBER		
	LOGS MERANTI RELPRI	LOGS SAPELE RELPRI	SAWNWOOD RELPRI	LOGS MERANTI RELPRI	LOGS SAPELE RELPRI	SAWNWOOD RELPRI	LOGS - MERANTI RELPRI	LOGS SAPELE RELPRI	SAWNWOOD RELPRI
1970	243	409	288	146	245	173	428	719	506
1980	98	147	155	64	96	101	183	275	289
1985	109	167	159	91	138	132	224	342	327
1989	93	126	124	94	127	126	112	152	150
1990	100	100	100	100	100	100	100	100	100
1991	92	113	115	91	113	115	103	127	130
1992	81	99	98	74	91	89	115	141	139
1993	46	113	99	37	91	80	59	144	127
1994	58	108	94	48	89	77	78	145	126
1995	55	104	91	45	85	74	71	133	117
1996	53	101	89	47	90	79	63	121	106
2000	63	113	103	44	80	73	61	111	101
2005	57	98	94	41	71	68	51	88	84

SOURCE:PREPARED BY THE AUTHOR FROM WORLD BANK DATA

TABLE 3 FINANTIAL AND ECONOMIC PRICES FOR COSTA RICA TIMBER.

YEAR	ECONOMIC PRICES US$/CM	FINANCIAL PRICES US$/CM
1980	89.2	14.9
1981	75.9	8.2
1982	63.1	6.4
1983	63.3	7.6
1984	53.9	9.9
1985	51.2	8.8
1986	55.6	9.8
1987	68.6	9.8
1988	72.2	9.2
1989	72.4	9.9
1990	81.7	10.8
1991	76.9	11.7

SOURCE:PREPARED BY THE AUTHOR BASED ON DATA FROM THE WORLD BANK AND THE DIRECCION GENERAL FORESTAL DE COSTA RICA.

TABLE 4 FOREST SECTOR PARTICIPATION ON SECTOR GNP.

YEAR	PARTICIPATION BASED ON ECONOMIC PRICES	PARTICIPATION BASED ON FINANCIAL PRICES
1980	4.5	16.8
1981	3.2	19.5
1982	2.5	16.6
1983	2.6	12.6
1984	3.1	11.8
1985	3.1	12.2
1986	3.3	11.5
1987	3	15.6
1988	3.1	16.6
1989	3.1	15.3
1990	3.8	19.8
1991	5.4	24.5

SOURCE:PREPARED BY THE AUTHOR BASED ON DATA FROM THE
WORLD BANK, DIRECCION GENERAL FORESTAL AND THE BANCO CENTRAL OF COSTA RICA

TABLE 6 LEVEL OF SUBSIDIES PER CUBIC METER.
CONSTANT 1990 COLONES PER CUBIC METER.

YEAR	COLONES PER CUBIC METER
1980	30.5
1981	168.3
1982	443.7
1983	355.3
1984	356.3
1985	439.4
1986	593.3
1987	1360.5
1988	2254.4
1989	2397.5
1990	3121.2
1991	6103.3

SOURCE: PREPARED BY THE AUTHOR BASED ON DATA FROM THE WORLD BANK, DIRECCION GENERAL FORESTAL AND THE BANCO CENTRAL OF COSTA RICA

TABLE 7 MACRO ECONOMIC VALUATION OF A HECTARE OF TROPICAL RAIN FOREST
UNIT CONSTANT DOLLARS.1990
COUNTRY COSTA RICA.

CATEGORIES	VALUE IN CONSTANT DOLLARS PER HECT 1990	STRUCTURE %
AT MARKET PRICES		
CARBON FIXATION	77.00	32
WOOD PRODUCTION	39.28	16
ECOTURISM	66.50	28
ELECTRIC ENERGY	27.69	12
WATER FOR DOMESTIC AND RURAL USE	27.80	12
PHARMACEUTICALS	2.31	1
WILD PLANTS AND ANIMALS	51	21
TOTAL VALUE	240.58	100.00
AT MARKET PRICES		
CARBON FIXATION	77.00	8.78
WOOD PRODUCTION	625.10	71.24
ECOTURISM	66.50	7.58
ELECTRIC ENERGY	27.69	3.16
WATER FOR DOMESTIC AND RURAL USE	27.80	3.17
PHARMACEUTICALS	2.31	0.26
WILD PLANTS AND ANIMALS	51	5.81
TOTAL VALUE	877.40	100.00

SOURCE:UNPUBLISHED MATERIAL FROM CATIE RESEARCH.
Y CONSERVACION.TURRIALBA.COSTA RICA.