

## FOREST CHARGES AND TRUSTS: SHARED BENEFITS WITH CLEAR RESPONSIBILITIES

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Foresters have a dilemma. Forests are extensive resources with dispersed pockets of high commercial value and other pockets of great environmental risk. Protecting these resources is difficult because it is difficult to exclude unauthorized users from the forest—and most forests are subject to illegal logging and other incidents of forest trespass. The public holds foresters responsible for both the high-value sites and the extensive regions of occasional trespass. The foresters' dilemma is compounded by the contrast between national and local values for the forest. National concerns with deforestation, biodiversity and the unique characteristics of the natural environment compete with the local importance of forests as sources of land for the agricultural development of expanding upland populations.

This dilemma causes many foresters to be sympathetic with the idea of community-based forest operations—but with strict controls on the community operations and careful collection of the government fees for wood resources. It seems to describe the Department of Environment and Natural Resources' (DENR) justification for its Community-Based Forest Management Program (CBFM) and it seems to underlie DENR's evolving position on Industrial Forest Management Agreements (IFMA). CBFM places forest land

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under local community management. IFMA takes land from canceled Timber Licensing Agreements (TLAs) and encourages its sustainable management by commercial timber enterprises. Both intend to ease the government's administrative responsibilities and increase private initiative while maintaining DENR oversight in order to protect the environment and recover public revenues.

The objective of this paper is to examine CBFM and IFMA within the context of efficient forest management. We will look for ways to accomplish agency, community, and commercial forestry objectives while decreasing costs for each of these institutions. The key is to focus DENR effort on the resource it manages—land and forests, not logs—and on the specialized cases across the forest landscape that pose significant environmental risks or promise large revenues for the government treasury, while reducing DENR's management costs in the more general and lower-value cases where either local communities or a commercial enterprise can do a better job. We also think that DENR should maintain a vigilant eye on the environment for long-term forestry investments created by the government management of the macroeconomy, as well as by DENR's own policies.

We will begin by reviewing the underlying principles of forest development and by identifying the potential for sustainable management and the collection of forest revenues. We will also consider the development and administrative costs required to protect the environment and those revenues. We will see that transferring property rights from DENR to local communities or private managers will not guarantee sustainable management and that plantation forests are not always a viable substitute for resources extracted from natural forests. That is, local communities and local private management can improve the conditions for sustainable land management and even for forest plantations—but they will never be economically efficient to manage all forests sustainably.

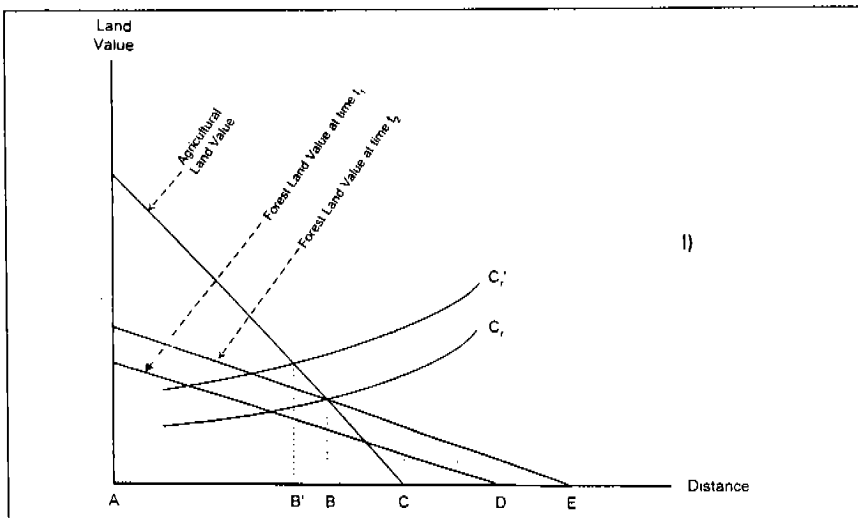
The latter part of our paper will examine CBFM and IFMA within the context of these principles. Community management and private forest enterprise have much to recommend, but current DENR oversight interferes with both. Our main conclusion is that redirecting DENR's financial and human resources to focus on critical environmental tasks and on those higher-value timber opportunities which foresters are better trained to manage will improve local economies, increase the potential for sustainable management, and increase the net collection of government revenues.

**PRINCIPLES OF FOREST DEVELOPMENT**

The most general principles of forest development are contained in a simple diagram of the agricultural and forest landscape. Consider agricultural land first. The value of agricultural land is a function of the net farmgate price of agricultural products—which is greatest near the local market at point A in Figure 1. Land value declines with increasing distance to the market as described by the horizontal axis. The function  $c_r$  represents the cost of establishing and maintaining secure rights to this land. This function increases as public infrastructure and effective control decline with distance from the market. The cost of obtaining legal title may remain constant with distance but the cost of excluding trespassers increases dramatically until no number of forest guards can fully exclude illegal loggers and other local users of the forest in remote areas.

The functions explaining agricultural land value and the cost of secure property rights intersect at point B. Farmers will manage land between A and B for sustainable agricultural activities. They will use land between points B and C (where agricultural value declines to zero) as an open access resource to be exploited for short-term advantage. They will harvest native crops that grow naturally in this region, crops like fodder for their animals, native fruits, and fugitive

**Figure 1. The Landscape of Forest Development**



resources like wildlife, but they will not invest even in modest improvements in the region between B and C because the costs of protecting investments in this region are greater than the investments are worth. Their use of this open access region is unsustainable.

The mature natural forest at the frontier of agricultural development at B has an initial negative value because it gets in the way of agricultural production and its removal is costly. When the forest begins to take on positive value, it must be worth less than agricultural land and the function describing forest value must intersect the horizontal axis in Figure 1 at some distance beyond point B. Market demand justifies the removal of forest products at this point, and it continues to justify their removal until the forest frontier eventually shifts out to some point like D. At this point the market price of forest products just equals the cost of their removal and delivery to the market. The *in situ* price (the stumpage value for timber, for example) is zero, and the value of forest land at D is also zero. The region of unsustainable open access activities now extends from point B out to point D. The costs of obtaining and protecting property rights insure that this region will remain an open access resource. Some trees will re-grow naturally in this degraded region and the region's natural resources will be exploited in periodic "pulse" harvests as soon as they grow to their minimum commercial value. The region beyond point D remains an uneconomic and unexploited natural forest residual because the costs of exploitation exceed the value of products removed.

This story conforms with the common description of any initial settlement, including modern settlement by migrants to the Philippine uplands. It also conforms with the pattern of land use in stable upland settlements, and it conforms with our image of commercial logging in the Philippines for the last forty years. We described the pattern of initial settlement. Consider the other two cases of stable upland communities and commercial logging.

Farmers in stable upland communities make long-term conservation investments in agricultural technologies like terraces on land where their property rights are secure, and sometimes they walk long distances to the natural forest for products like fruit and rattan. Some use the open access areas between their agricultural plots and the forest to graze their livestock, a traditional pulse activity, and many continue to collect fuelwood from the degraded open access areas as soon as the scattered woody matter grows to a burnable size.

The forest first slows the rate of agricultural development but later, as timber becomes a valuable commodity, loggers begin to clear an area beyond the agricultural settlement. As timber becomes increasingly valuable, loggers clear areas ever-farther from their prime markets. They "cut and run" and leave a "no-man's land" of degraded forest behind them. They always harvest to the point where the full resource value is dissipated in harvest and access costs because, if they left "value on the stump," another logger would take it.

Closer examination of the cost of secure property rights points to another important case. The cost of protecting these rights is greater for absentee landowners than for local landowners. This suggests an absentee landowner cost function like  $c_r'$  in Figure 1 where land to the right of point B' is effectively open access despite its legal registration to an absentee owner. Transferring land in the region between points B' and B to lower-cost local owners would encourage its sustainable management. Of course, DENR is an absentee landowner, and this explanation is the rationale for transferring some DENR properties to upland settlers or to lower-cost community forestry operations.<sup>2</sup>

Consumers in our landscape in Figure 1 must go beyond point D if they continue to demand the products of forest resources. Access costs for forest products (and the product prices) must continue to rise until some later time  $t_2$  when the higher market price equals the cost of tree crop substitutes for forests (including the cost of local property rights  $c_r$ ). When this price also exceeds the opportunity cost for agricultural land, then trees will begin to compete as successful crops (either plantation forests or agroforestry) somewhere to the left of point B (or point B' for the properties of absentee landowners). Consumers will continue to remove some products from the new frontier of mature natural forest at E. Subsequent to  $t_2$ , plantation forests to the left of B and pulse harvests from the region between points B and E will satisfy all demands for forest products. No further extraction will occur from the natural forest beyond point E because the access costs associated with ventures into the natural forest exceed the market price.

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2. Tomich *et al.* (1995, chs. 4,5) explain that the costs of protecting a unit of property increase with the size of the property—as well as with distance. DENR manages the largest unit of land in the Philippines. Therefore, its costs for protecting the property are probably greater per hectare than the costs of any other landowner in the country. This is a related, but additional, reason to transfer some DENR properties to upland settlers or to lower-cost community forestry operations.

This story is well documented with rigorous economic analyses, and with examples from many cultures and developmental experiences.<sup>3</sup> There are many examples of subsistence farmers who plant trees in agroforestry operations or small plantations, but there are many other examples in other parts of the Philippines where the prices of forest products are not yet sufficient to induce this smallholder activity. This means that some local markets (perhaps like those in most of Palawan) fit the description of our Figure 1 landscape at  $t_1$  with a natural forest frontier at D, while others (perhaps much of Bohol and Cebu, for example) fit the description at  $t_2$  with a natural forest frontier at E and some tree crops to the left of point B. The industrial plantations of PICOP or the other industrial plantations near Butuan City, for example, are evidence that prices in the world markets for commercial forest products are a sufficient private incentive to support our  $t_2$  characterization of them.

## MODIFICATIONS OF THE PRINCIPLES

Our diagrammatic presentation is simplified because it shows an unchanging agricultural demand and a single price for forest products, and because it overlooks stock effects. Growing upland populations and increasing food demands would push the agricultural land value

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3. For example, Hofstad (1997) describes rising charcoal prices and ever more-distant wood removal in the region surrounding Dar es Salaam, Tanzania; Chomitz and Gray (1994) describe a similar pattern for roads, agriculture, and deforestation in Belize; and Krutilla *et al.* (1995) provide a more general example for deforestation around 33 urban centers in Africa, Asia, and Latin America. Alston *et al.* (1996) describe the relationships between settlement, property rights, and rising prices on the frontier of Brazil's Amazon. Both Johnson and Libecap (1980) and Berck (1979) show that 19th century US logging never extended into the frontier at more than a financially optimal rate.

Several recent analyses describe situations where prices have risen sufficiently to induce investments in sustainable forestry. See Hyde and Seve (1993) for Malawi where subsistence household plantings may overcome a 3.5 percent rate of forest depletion within ten years; Scherr (1995) and Patel *et al.* (1995) for western Kenya which shifted from ninety percent dependent on natural forests for construction wood in the 1950s to eighty percent dependent on forest plantations today; or Amacher *et al.* (1993b) and Singh (1994) for similar stories for Pakistan's Northwest Frontier Province and India's Punjab, respectively. Amacher *et al.* (1992, 1993a) examine two districts in Nepal and describe the production, price, and consumption differences that cause subsistence farmers to plant trees and adopt wood-saving technologies in one district but not the other. Vianna *et al.* (1995) show that, once the market price rose high enough, even Brazil nuts, for many the forest product that has been least responsive to scientific intervention, have been domesticated in commercial plantations.

function to the right over time. This would shift points B and C to the right. Additional forest products, each with their own prices and forest value functions, would have their own points D and E—and local inhabitants would go different distances into the standing natural forest to extract different products. The general diagrammatic characterization of the problem, however, remains the same in any case.

Stock effects measure the forest's value as a standing resource. If we anticipate that either biological growth or changes in forest product prices will increase the value of standing timber over time, then current market prices will underestimate the true long-run value of the forest. The forest frontier at either D or E set by current market value will be too far to the right and the current level of logging is excessive. This problem should not concern us too much because the natural forests at the frontier of economic activity are mature. Their growth rates are insignificant. Moreover, virtually all world natural resource prices for which we have extensive records have declined (in inflation-free real terms) over the last 200 years.<sup>4</sup> World prices for tropical hardwood logs are probably holding steady, and they may eventually decline as well. Therefore, the stock effects are probably small and they may be negative. Negative stock effects (due to decreasing real prices) would redouble the incentive for loggers to harvest as far as they can today because the values they pursue may be lower tomorrow.

## FUNDAMENTAL CONCLUSIONS

The fundamental conclusions from this analysis should be clear: 1) An expanding region of deforestation causes delivered forest product prices to rise (but not *in situ* prices); rising prices eventually

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4. Stumpage price records are problematic. Barnett and Morse's (1963) classic study of long-term price trends for primary resources found that US lumber prices were increasing, but pulpwood prices were not. They did not find acceptable stumpage price records. Sedjo and Lyon (1990) observed that any long-term trend for US stumpage prices to increase has probably run its course. Stumpage price trends are problematic because (barring policy constraints that create rents) the value of timber from natural forests is entirely consumed by harvest and access costs. Timber from plantation forests, however, will have a positive stumpage value. Therefore, the average stumpage price for any region will range upward from zero depending on the importance of rent creating policy constraints and the share of all harvests that originate from commercial plantations. These points should become clearer in the discussion of forest rent that follows.

induce investments in agroforestry and commercial forest plantations and bring an end to deforestation and exploitation of the remaining natural forest. This insight provides a ray of hope for global concerns on tropical deforestation and for our own desire to protect some of the Philippines' residual forest of native trees. 2) There is an important and extensive region in which open access and unsustainable management is efficient because the costs of defending property rights in this region exceed the fundamental values at risk. Environmental and other non-market forest values that originate in this region will require the specific attention of DENR managers.

People will use the land between points B or B' and D or E, but they will treat it as an open access resource. They will not manage it sustainably because sustainability implies long-term decision making and protecting the land for future uses, but the costs of protection exceed the values at risk. Legal or administrative action can shift some responsibility from DENR to the local community or local land manager (thereby shifting the cost function from  $c_r'$  to  $c_r$  and shifting point B' toward point B) but neither legal nor administrative action alone can change the condition of unsustainable land use. Some land will remain between points B or B' and D or E and no private investor will manage this land sustainably.

Moreover, at the frontier of natural forests, government regulation in any form is expensive (the difference between the horizontal axis at D or E and  $c_r'$  in Figure 1) and it protects a resource that has no *in situ* value. This means that pure economic rents seldom exist because some alert entrepreneur would have harvested to the frontier at point D or E, and extracted the rents in a previous period. The entrepreneur would have been there legally if there were no government restrictions. If legal or administrative restrictions did exist, but the enforcing agency could not afford the full costs of complete enforcement implied by  $c_r'$ , then some entrepreneur would have found a way to be there illegally. Clearly, this shows us that it is easier to write policy than to enforce it, and that the gains from enforcing many forest policies do not justify their costs.

Our two fundamental conclusions are valid for commercial timber. They are also valid for most other forest resource values because most forest values are represented in local agricultural markets even where the predominant economy is subsistence-based. They are true in the greater reaches of Manila in, for example, the forested areas of the province of Laguna, and they are true in the sitios of South



Cotabato. The only difference will be that forest product prices have risen to the level that justifies tree crops in some regions but will not have risen to this level in others.

The critical implications for public policy are:

- to simplify the pursuit of forest charges for the government treasury;
- to examine the policy environment for ways to shift the property right functions in Figure 1 and the patterns of land use in ways that will improve the incentives for long-term sustainable management and satisfy social and environmental objectives.

This is the challenge—and it should be the guiding principle of policy change. It is the spirit of CBFM, and perhaps IFMA, but it deserves amplification in order to demonstrate the reasonable policy outcomes.

CBFM is designed for the many cases of smaller and local forest values where DENR has tried but been unable to enforce its preferred activities. Local operators with site-specific knowledge and lower enforcement costs will do better in some locations. Furthermore, the shift from DENR to local responsibility will ensure an increase in the sustainable land use base comparable to region B'-B in Figure 1. This is a desirable result. Whether or not the local forest product price induces tree planting and long-term forest management is a local empirical question. Some of the increase in long-term management will convert previously degraded forests to agricultural uses. Others may become tree crops. Both are sustainable. Therefore, both are environmental improvements. However, open access and unsustainable forest exploitation will occur under any scenario. DENR and the general public must accept this.

The larger industrial operations that produce higher-value forest products for the broader economy are a related case that will benefit from the closer examination of forest rent in the next section of our paper. It should be clear that DENR's reasonable objective for these operations can be explained as reducing its oversight costs (from  $c_r'$  toward  $c_r$  in Figure 1) while still ensuring good environmental performance. Once more, this action will ensure an increase in the sustainable land use base comparable to region B'-B in Figure 1, but whether the local forest product price is sufficient to induce plantation management is an empirical question that will vary from

location to location and from one commercial operation to the next. Legal requirements for reforestation will not make it happen. The recent experience of unsuccessful reforestation subsidies for Timber License Agreement is clear evidence of this point. Once more, some unsustainable open access forest exploitation will occur under any scenario.

This unsettling conclusion is best addressed by reminding ourselves of the reason we object to it. We object because, in some important cases, it degrades the environment, which in turn affects future uses of this land and its resources, as well as of adjacent lands. In forest environments, the major forms of environmental degradation are soil erosion (steep slopes, stream banks, and critical watersheds) and loss of biodiversity (old growth and rare and endangered species). Fortunately, soils do not erode and biodiversity is not lost in every location where someone extracts forest resources. Fortunately too, foresters are trained ecologists whose basic instincts are to respect these environmental aspects of the forest. Therefore, the solution is to identify the critical areas for protection against erosion and loss of biodiversity before the unsustainable extraction activity begins, to remove these areas from the land base eligible for extractive activities, and to direct a renewed DENR forestry focus on protecting these critical areas. Neither DENR nor any other forest ministry has the financial resources or the personnel to worry about all areas. It must concentrate its limited resources on the critical areas that demand greatest attention. This solution simplifies things by focusing directly on the key objective of environmental protection. It will be a major component of our recommendations for CBFM and IFMA.

## **FOREST RENT REVISITED**

It may be instructive to take a closer look at forest rent, and also at the impact of uncertain policy expectations. An understanding of the potential for rent will be important for assessing reasonable charges for industrial forest operations, and perhaps for some community-based operations. An understanding of the destructive effect that uncertain policy environments have on long-term capital investments will be important in assessing reasonable expectations for sustainable industrial forestry operations.

Our earlier claim that rents are uncommon begs questions about why loggers continue cutting trees, why their profits may seem excessive, and under what circumstances significant rents do arise. Loggers continue cutting because there is sufficient opportunity at the margin to obtain a fair return on capital investments in logging equipment. Excess profits are unlikely, however, as long as there are no barriers to restrict entry to the logging business. New entrants will compete and bid away the excess.

Purchasing the logging equipment, building a road to the site, and delivering the equipment to that site is expensive. It requires a large capital investment (even when the logging itself is done with chainsaws and carabao). Road costs alone generally exceed the value of a single block of timber, and loggers only recover these road costs by harvesting several blocks of timber off the same road. What may seem like a large absolute value for the timber taken from a logging contract often barely reimburses the capital expenditures and leaves very little for a fair return on the capital investment. We know this because the logging business is like the small retail sector or the restaurant business. There are many small entrepreneurs and many failures for every large and lasting success.

Indeed, logging operators in the Philippines are too numerous and often too small to show up in government records, and even the sawmill sector has a large component of small entrepreneurs who experience only temporary. For example, sixteen percent of national sawmill capacity in 1994 was classified as mini-sawmills and more than one-half of these were inactive (DENR nd).

### **Sources of Forest Rent**

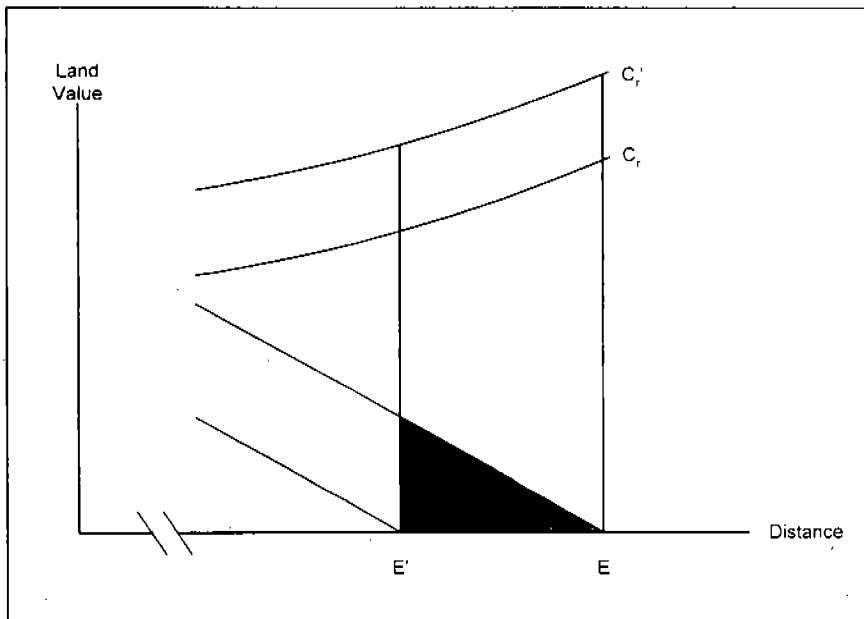
Nevertheless, examples of large rents probably do exist, and we can imagine the potential for excessive profits where some exogenous action creates a sharp and rapid, even sudden, shift in the forest land value function at points D or E in Figure 1. Figure 2 magnifies the relevant section of Figure 1 in order to focus on such shifts. The exogenous action creates an increase in the forest land value between two periods, such that the frontier of natural forest can shift from some previous point E' to point E in Figure 2 and create rents or excess profits equal to the darker-shaded area. This action must be rapid or private investors would anticipate it, invest accordingly, and extract the rents as they gradually rise in small

increments. We can imagine two general actions that fit this description: increased rural infrastructure (roads in particular) and effective timber harvest constraints.

Roads are the best example of improved infrastructure affecting forestry. Building a new road into the interior rapidly makes the previously inaccessible forest more accessible to the market. It shifts the intersection of the forest land value gradient from  $E'$  to  $E$  and creates a rent equal to the darker area in Figure 2. We often overlook that this rent is a return to roadbuilding, and the authority arranging for the road may have a claim on its collection.

The second potential source of forest rents is an effective forest policy constraint, most commonly administrative procedure that slows the approval rate for acceptable harvest concessions, or a policy that restricts concessions from select areas or restricts annual harvest levels within a concession. Either the administrative procedure or the policy constrains harvests while prices rise (or access costs decrease) over time and the land value gradient moves out to point  $E$  in Figure 2. Once more, a forest rent equal to the darker area arises.

Figure 2. Forest Rent



The agency responsible for the constraint (or the road) created the rent, but the existence of this rent raises several questions: Why did the constraint exist in the first place and why does the agency want to relax it and allow logging now? What has changed? If relaxation of the constraint is an appropriate action now, then why was it not appropriate at some earlier time? Are there other forested areas in the country where the policy still constrains harvests? Should the agency relax the constraint in these areas as well? (We could ask similar questions about roads into other new areas.) These are important questions because the constraint forces the economy to forego a real financial gain equal to the rents from all such areas. Any government should be very clear as to why it would make such a decision.

This point is doubly true because effective enforcement of the constraint is probably very costly. We can see this by recalling that the costs  $c_r$  of protecting the rights to the forest property exceed the value of forest land at the frontier. On the other hand, fully effective enforcement is seldom possible as the government probably could not afford the costs necessary to exclude all trespassers from the forested region between  $E'$  and  $E$  in Figure 2. An unprotected rent is an incentive for illegal logging, and a history of illegal logging indicates that the remaining forest and the remaining rent in Figure 2 (the darker shaded area) would be smaller than anticipated.

The Philippines has two excellent examples of policy constraints that create rents. The first is any adjustment in the annual allowable cut (AAC) that actually leads to an increase in timber harvests. Adjustments in the AAC are government policy and where the previous AAC was a significant constraint, and if illegal logging did not deplete the resource, then a rent built up. It awaits collection whenever DENR makes the policy decision to increase the AAC. The second example of rent creation is the case of Lianga Bay. The rents in this case were created by a militant local population (rather than central government authority) who still prevent access to the resource by outsiders. Regardless of our political judgment of the local action, it created a rent that awaits collection once loggers are allowed renewed access to the resource.<sup>5</sup>

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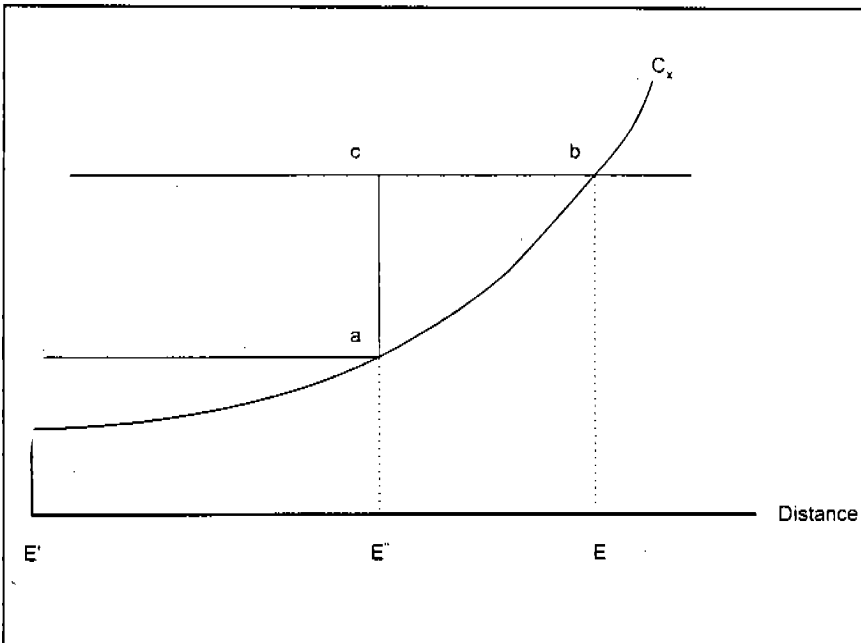
5. The Philippine log export ban is a third example. An effective log export ban would cause a rent to build up—just as an effective AAC does. We generally observe that log export bans are difficult to enforce ( $c_r$  is high), illegal logging tends to occur, the rents dissipate, and log bans are not especially effective.

**Collecting Forest Rents**

Finally, if some effective action created a rent—for whatever reason and at whatever cost—then the next question is what would be the best way to collect that rent. Foresters generally collect rents as product prices, usually stumpage fees or log charges. Figure 3 provides a variation on the depiction of forest rent that allows us to focus on log charges. The vertical axis is value per log (rather than value per land unit) and the horizontal axis continues to measure distance or decreasing access—as in Figures 1 and 2. The delivered price of forest products is  $p_f$  (for example, the price of logs at the mill or at the port) and  $c_x$  is the cost of harvesting and delivering the logs. The harvest and delivery cost increases with distance or decreasing accessibility. Rent, equivalent to the darker-shaded area between  $E'$  and  $E$  in Figure 2, is the full area between  $p_f$  and  $c_x$ . It is the total stumpage value for all standing timber between points  $E'$  and  $E$  in either Figure 2 or Figure 3.

Identifying the maximum stumpage value for each log or each increment of standing timber is a practical impossibility. Therefore,

**Figure 3. A Second View of Forest Rent**



many forest ministries rely on a uniform fee per delivered log. (In the Philippines, DENR distinguishes between species groups but the fee remains uniform with respect to the location of log removal or the difficulty of extracting and delivering it.) In Figure 3, this is equivalent to collecting  $p_f - p_1$  per log out to point E". It should be clear that, in this case, the rent collected by the government is less than the full rent available. Furthermore, uniform fee structures like this restrict profitable logging to the region between E' and E" and leaves an incentive (profits equal to the triangle abc in Figure 3) to illegally log the region between E" and E.<sup>6</sup>

A long tradition explains forestry's general reliance on auctions of stumpage or logs, but the tradition does not fit the modern Philippine forestry situation. The German and French foresters who, 100-150 years ago were the forebears of modern forestry, managed the forest did the logging, and sold the logs themselves. They needed an inventory of standing timber in order to plan their long-term harvest operations, and they scaled the logs they harvested in order to discriminate by grade in their log sales.

British and North American foresters learned their forestry technique from these Europeans, and then taught others, including the early faculty at the University of the Philippines College of Forestry at Los Baños. No one seems to have re-examined the local context. The European procedures are only partially applicable in North America where public agency foresters often manage the forest but never do the logging. These procedures are not applicable at all in the Philippines and many other places where public agency foresters assign the use of a timber concession (an area of forest land, not a log), and a private operator manages the concession and the logging activity.

Any operation in any enterprise succeeds best by focusing on the market for its own product. The European foresters did their best by preparing for and establishing log markets. Philippine foresters would do their best by preparing for and establishing markets for the rights to use land and forests. This means that lump sum auctions for use

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6. The maximum stumpage fee  $p_f - p_0$  will not maximize rent collection because it minimizes the number of logs. The maximum rent collection from a uniform fee is a mathematical function of  $c_x$  (or a function of the elasticity of extraction and delivery costs). This maximum is an empirical question that varies with each logging site and each timber concession. Clearly, a broad regional or national logging fee does not satisfy any obvious objective, imposes significant collection costs, and invites illegal logging.

rights to the specified forest areas would be an improved alternative to log fees—so long as entry to the auction is open, additional bidders are welcome, and the size of the sale is not so large as to limit competition.

Lump sum auctions for the rights to use a specific forest area decrease both government costs and the costs of the private logger, and they insure that the government collects the maximum forest rent. They decrease government costs by removing the need for government forest inventories, log scalers, and collectors of log fees. They also cut the need for the government authorities to monitor the movement of log trucks. In sum, the administrative task of collecting one single lump sum fee is much simpler than the task of collecting many individual log fees. Removing government scaling and monitoring activities also eliminates the incentive for loggers to mask the origin of logs from public lands and frees the flows of log trucks. For some loggers, this would save enough log delivery time to allow them to make two loads per day rather than one. This difference decreases costs for the logger, increases the return on the loggers' investments in trucks by as much as 100 percent, and enables loggers to increase their lump sum bid prices. Higher bid prices means even greater government rent collection.

In terms of Figure 3, private bidders would not bid on land or forests beyond point E because their own costs exceed their potential gains. They might bid up to the full rent for the region from E' to E, but each bidder's judgment of this rent and his/her best bid would depend on the bidder's own costs  $c_x$  and the price  $p_f$  that the bidder can obtain for delivered logs. Bidders would rely on appraisals conducted in their own interests. Government timber appraisals are expensive, and they are unnecessary in regions with multiple logging firms and free entry to the auction. The government only needs to mark the sale boundaries, host the auction, and monitor its environmental harvest standards.<sup>7</sup>

Environmental harvest standards and environmental monitoring were unnecessary for the old European foresters because they

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7. The government cost savings are not trivial. In the United States the costs of government timber sales exceed timber sale receipts on 62 of 156 national forests. Boado (1988) claims that DENR timber operations, like government timber operations in the US, cost more than they return to the Philippine treasury. Surely, the expensive costs of conducting timber inventories and appraisals, of log scaling and stumpage fee collection and enforcement are part of the problem. All of these costs are unnecessary with lump sum auctions, rather than sales of logs or units of stumpage.



managed the environment themselves. Environmental standards are necessary in the Philippines because the concessionaire wins only a restricted right to land that will eventually revert to the government. DENR and the Philippine public have a continuing interest in the long-term condition of property that it only leases to concession operators. We will discuss environmental standards in more detail in our recommendations for CBFM and IFMA.

Auctions should be designed to attract multiple bids, and auctions of large tracts which only attract single bids should be divided and rebid with the objective of receiving more bids. Single bid auctions on small sales will be relatively unimportant because they can only occur in locations where the values at stake are so low as to fail to entice competition. Moreover, a small number of bidders for any local timber sale means that only local actors have the situational knowledge necessary to extract gain from it. In this case, the rent may really be a return on the bidder's local knowledge. Taxing it away would be a disincentive for local entrepreneurial activity. Furthermore, the government's administrative costs for obtaining greater rents on small single bid auctions would probably exceed the value of rents collected.

Altogether, these insights instruct us to rely on lump sum auctions for land use, not auctions of logs or stumps, and to focus on locations where the auctions will entice multiple bidders and large bids—but to minimize government costs and to rely on the advantages of local operations in the many small and general cases of few bids and low bid values. In the Philippines, IFMA fits the former case and CBFM fits the latter.

## **A STABLE POLICY ENVIRONMENT**

As foresters we often overlook the importance of a stable economic and political environment. Stability means predictable and consistent expectations about change. (It does not mean "no change.") Unstable macroeconomic and policy environments destroy the incentives for long-term investments in activities like sustainable forestry, and encourage practices like "cut and get out" logging behavior. These can be real problems in this day of ever-increasing environmental demands and changing responses of forestry agencies to these demands.

Both forest plantations and the heavy equipment necessary for large scale logging are long-term investments. In the presence of macroeconomic instability and policy uncertainty, firms would underinvest in plantations and logging equipment because they cannot be sure of obtaining the full return on their investments before the economic or policy environment turns to their disadvantage. Conversely, improving macroeconomic conditions and an increasingly reliable policy environment would induce capital investment. Capital investment in forests would be a step toward sustainability. Capital investment in better equipment would allow logging firms more efficient use of all inputs, including the land and trees. This may mean that loggers would harvest farther into the frontier, and it would certainly mean that they will utilize the forest they already harvest more completely. Improved utilization (more lumber recovery per log, greater use of low-valued species, more recovery per acre, and less residual scrap wood left on the forest floor after harvest) is a frequent environmental policy objective. A stable macro-economic and forest policy environment will help achieve it.

A stable macroeconomic and policy environment is an evolving condition. It takes time to build and, therefore, is unlikely to create excess profits. A sudden deterioration of this environment, however, can destroy long-term capital investments, decrease forest investments, and disrupt long-run forest management. Deacon (1994, 1995) showed that this is a critical source of world deforestation, accounting for up to twenty percent of the variation in deforestation across countries.

In terms of Figure 1, an unstable policy environment means that the forestry enterprise does not have confident expectations about whether government rules defining  $c_r'$  will either relax or become more confining. Similarly, the enterprise does not know whether government scaling and log market requirements will relax or tighten. It may not know whether periodic community or DENR review of its management plans would force a shift in some strategic activity. Finally, it does not know when DENR might enforce its rules on illegal logging and void the enterprise's contract—regardless of who actually did the illegal logging. In this unstable policy environment, the firm would probably do best to protect itself against the less favorable possibilities. This means it would act as if  $c_r'$  will be higher and prices will be lower. The first shifts point B' to the left and expands the area of unsustainable open access land management between points B'

and B. The second decreases forest land value, thereby delaying the time when sustainable forest investments become financially justifiable.

In terms of Figure 3, for areas where significant forest rents do exist, an unstable policy environment causes loggers to act as if  $p_f$  may fall and  $c_x$  may rise. This means the efficient harvest level would decline. It induces loggers to harvest toward E as rapidly as they can—before policies change. Thus, an unstable policy environment delays or decreases sustainable forest practices like plantations, increases the area of unsustainable open access exploitation for whatever land use activity, and encourages rapid harvest behavior and lower levels of forest utilization in logging concessions. All are undesirable from the perspectives of both economic development and the environment.

An unstable policy environment is a serious issue, and one that probably has significant implications for Philippine forestry today. We can see this by making two comparisons, one with forestry in Indonesia and one with investments in the general Philippine economy. Forest concessions in Indonesia endure and concessionaires do invest in plantations in some places. Neither seems to be true in any substantial sense in the Philippines. Indonesia may provide concessionaires more favorable treatment, and the Philippines may or may not think that favoritism is justified. That is not the point. Indonesia clearly provides more reliable forest policy expectations. Reliability is a necessary ingredient for long-term investments, and it explains the different levels of forestry success between Indonesia and the Philippines.

The overall Philippine economy in recent years also demonstrates the importance of policy stability for forestry. The EDSA revolution improved the political environment but it left investors cautious. They were encouraged, but they watched and waited while they confirmed their favorable expectations. The economy stuttered through a period without much capital inflow. With time, confidence did build because government macroeconomic policy and especially policy toward capital investment remained steady. In time we began to see capital inflows and long-term investment—in private construction, in consumption of consumer durables, and in public infrastructure. The level of capital investment in the last six or seven years has been phenomenal.

Logging equipment and plantations are long-term investments—although neither is expected to last as long as some of the

construction we see in Manila or Davao City today. So why is forestry an exception to the recent general Philippine success with long-term capital? One reason is that the forest policy environment places forestry investors in a very uncertain operating environment. Investors face an almost perpetual review and re-approval process, with serious likelihood of effective challenge to reasonable behavior, as well as numerous impossible standards which could be used at any time to void their contracts with DENR.<sup>8</sup> DENR must find a way to satisfy an environmentally conscious public while improving investment policy expectations if it wishes to encourage serious long-term private forest management. And it must persevere in this objective because, as we saw following the EDSA revolution, investor confidence does not build overnight.

The positive side of this message is that the Philippines competes in a world of unreliable suppliers for tropical hardwoods and tropical hardwood products. That is, many of the other producer countries also suffer uncertain macroeconomic and policy environments. Improving the DENR policy environment should give the Philippines a comparative advantage over these competitors, transferring some long-term forestry investments from those countries to the Philippines, and further improving the prospects for sustainable plantation management and increasing government forestry revenues in the Philippines.

## **TWO APPLICATIONS OF THE PRINCIPLES**

### **Opportunities for Successful Community-Based and Industrial Forest Management**

More than 200 Timber Licensing Agreements (TLA) covered 2/3 of the forested area of the Philippines in 1976. Some have lapsed and some have been withdrawn. In their place 2.5 to 3.0 million hectares of forest remain, and the deforestation and unsustainable practices that caused all but 28 TLAs to lapse or be withdrawn go on despite

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8. For example, renewals of TLAs were always in doubt, and the required procedures for allotting IFMAs have already been changed three times. Extensive and regular NGO, local government, and DENR review written into current CBFM and IFMA policy extends the uncertainty.

the discontinuance of the timber concessions. Of course, an upland population of 10 million is largely responsible, and a substantial flow of migrants regularly increases this upland population and reinforces local deforestation and unsustainable land use.

Centralized forest management is a daunting task, and it has been largely unsuccessful. Something different must be tried. The generally preferred solutions are local community management of the many cases of generally lower-value forest resources and private sector management of the smaller number of high-value plantations and production forests. DENR seems to support both concepts. In the first case, the communities with the greatest stake in the resource would manage it for their own long-term interest—but with oversight from DENR. In the second case, DENR divides private sector management into two classes, but the general rule is to transfer land use to the private firm offering the best guarantee of sustainable forestry. In all cases, the community organization or the private firm agrees to pay a fee to the government for its forest products, generally logs. The question for our consideration is what would be the best way to transfer responsibility from DENR to the local communities or the private firm while insuring equitable distributions, sustainable practices, and financial returns sufficient to repay foreign loans for the forestry sector—while also improving the agency's public credibility. This is no easy task!

This final section of our paper recommends simple structures for accomplishing this task, first with CBFM and then with IFMA, and it concludes with a summary of new roles for DENR, including the advantages of a stronger environmental presence.<sup>9</sup> As we consider our recommendations, we must remember the principles we have just reviewed. We must also recognize that the best program design is the simplest—because more complex designs are more costly to administer, because forests are generally low-value resources, and because we know from experience that many of DENR's prior management strictures were difficult to enforce. Furthermore, many

9. Readers with further interest in existing policy for CBFM might refer to Executive Order 263 and DENR Administrative Order 22-1993 which are the basic documents, DENR memorandum 95-18 which sets up eleven pilot sites, and Community Forest Management Agreement 13-001 with the SAMMILIA Forest Development Cooperative (Liangá, Surigao del Sur). Readers with further interest in IFMA might refer to DENR Administrative Order 60-1993 and the IFMA Implementation Manual. The field experience of the NRMP staff and other DENR colleagues is also a useful resource.

of the old forestry rules and procedures are poorly designed or even unnecessary for DENR's objectives. They never did fit Philippine forestry administration realities.

The greatest difficulty for the Department will be our recommendations for changes in its own institution. (CBFM and IFMA could be core programs for a wholly revised forestry agency—with a new level of responsiveness to local resource-based human populations and to the environment.) If the greatest difficulty for DENR's foresters will be discarding old institutions, then the greatest satisfaction should come from the opportunity to renew their focus on serving the people and protecting the environment. These are the reasons most of us became foresters and they are the most basic elements of our training. It should be gratifying to get back to them.

### **General Recommendation**

Our first recommendation is to clearly distinguish between CBFM and IFMA. These are parallel programs designed to address different problems and to satisfy different objectives. Each has its own independent and specific purpose.

CBFM is intended to assist local communities. It reflects an underlying distributive objective of DENR and some of its critics. Locally specific knowledge gives additional value to the areas of CBFMs, and local use made prior DENR management of these areas both difficult and expensive. Therefore, CBFM is best-designed for generally lower-value areas which, nevertheless, are important to local communities. Heavy-handed impositions of external management criteria should be avoided in CBFM because they interfere with the intention of local determination and remove the financial incentive that local knowledge creates.

IFMA is best-designed for those larger and more valuable areas where large-scale private operations can successfully invest and obtain a commercial return on their investments. The land base for successful IFMAs can be plantations, degraded forests, or residual productive forests. The important characteristics, regardless of the land base, are the opportunity for a fair return on private investments of financial and material capital, some opportunity for the collection of government fees, and reasonable opportunity for sustainable management.

It is important not to confuse CBFM with larger-scale commercial opportunity, nor to confuse larger-scale commercial opportunity and government revenue recovery on IFMA lands with the very selective equity objectives appropriate to local communities and CBFM. Combining them—as “socialized IFMA” or as large CBFMs containing industrial forestry operations—only creates competing objectives and competing purposes and assures confusion and uncertainty for any private sector operation of whatever scale.

### **Recommendations for Community-Based Forest Management**

The basic problem in establishing a CBFM agreement with a local community or community organization is the selection of land use boundaries and of the local group to assign the land use rights. The first steps are to mark tentative boundaries and hold public meetings. The public meetings should focus on two simple objectives: refining DENR’s preliminary identification of boundaries and identifying interested individuals and local organizations with the capability to manage a CBFM. DENR does not need to face the plethora of issues that can arise in community debate. It does not want to be held accountable at a later date for some prior and obscure discussion. It should announce its intention to contain the discussion of these public meetings within these two topics, and then it should manage these meetings accordingly.

The second step is to draw final boundaries and to remove the most environmentally sensitive areas from within those boundaries, probably the steepest slopes, the stream banks, and any specific sites which are sensitive to biodiversity objectives. DENR remains the land owner and, like any other land owner, it is desirous of receiving its land in good condition at the end of the CBFM lease. DENR also has a responsibility to ensure that the uses of its land neither damage long-term social values like biodiversity nor damage adjacent lands and their uses. The best way to insure these conditions may be to withdraw those environmentally sensitive areas that are within the CBFM boundaries and to maintain them as a direct DENR responsibility. Direct DENR responsibility is probably better than the alternative of private CBFM management with environmental limitations and more indirect monitoring of private use by DENR. Direct DENR responsibility for the environmentally sensitive areas is also simpler and less intrusive than trying to enforce DENR’s own

management insights, insights which are certain to change over the lifetime of a 25-year renewable lease.<sup>10</sup>

The current CBFM documents require a forest inventory of standing timber volume, a formal management plan, and the assistance of a qualified professional assisting organization (AO) to help prepare them. These are unnecessary if DENR has ensured its environmental responsibility. The inventory of standing timber may not even refer to the non-timber resources that give the forest its greatest value for the local community. These activities are beyond local capability and comprehension, and the notion of an AO to advise on them is a denial of the CBFM intention to rely on local judgment. Furthermore, the inventory, the plan, and the AO are expensive. By definition, CBFMs are areas of generally lower-value which may not support these costs. They are also areas where DENR has had limited prior success in enforcing rules like harvest levels that are based on a timber inventory and a management plan. DENR's ability to enforce its management criteria will not change with the development of a plan or the contractual arrangements of a CBFM. DENR should eliminate these requirements from its CBFM contracts.

The third step is to transfer the use rights for the land within the final CBFM boundaries. Any local individual, collection of individuals, or organization that can sign a legal contract and which has the capability to manage a CBFM should be an eligible agent. DENR has no reason to discriminate in favor of, for example, licensed cooperatives, or any other specialized group. It has no reason to discriminate in favor of particular land uses (such as timber production). If local interest is weak, then DENR might donate the entire parcel of land to the community group or groups which it determines are most responsible. If interest is strong and multiple local groups display an interest, then DENR might either divide the CBFM among the groups—or conduct an auction.

Subsequent to transferring the rights to land use, DENR's continuing responsibility is to ensure a good climate for sustainable land management. The most encouraging situation would be described as "no continuing management oversight, no annual plan

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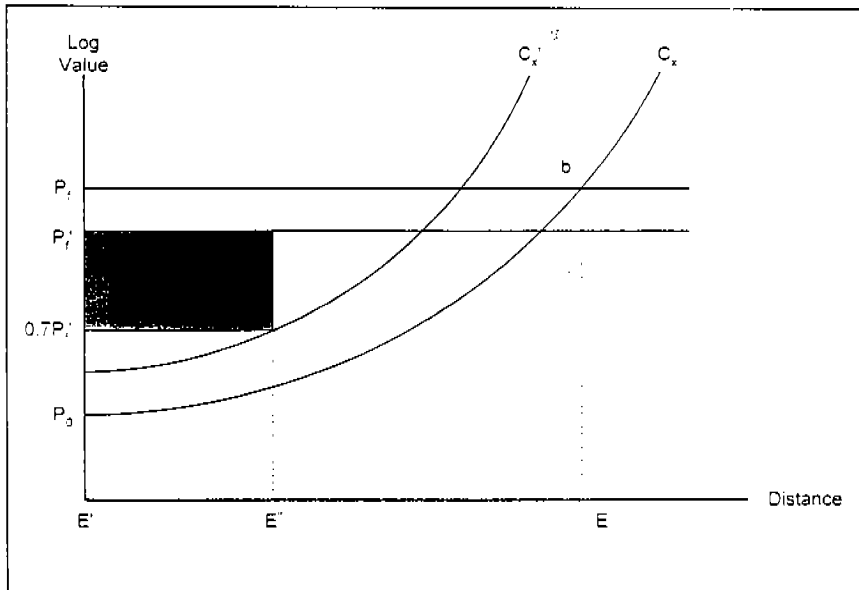
10. Some CBFM documents ban mechanical logging, for example. This ban constrains CBFM activities unnecessarily, and it constrains the opportunity for financial gain, in non-erosive areas. Furthermore, it will become less necessary as the world designs better logging equipment. It would be unnecessary now if the erosive areas subject to damage by mechanical logging were removed from the CBFM base.



preparations, no annual review with its own uncertainty and potentially delayed outcomes, and no restrictions on the marketing of forest products." Permission for land transfers from the successful first recipient of a CBFM contract to new groups after the contract has been awarded would ensure higher-value land uses and the optimal scale of local operations, as well as the adjustments to each of these features that must occur over the 25-year life of any contract. The likelihood of sustainable land use activities would increase as a result. DENR approval of any eventual transfers should be a simple formality so long as the new manager can live up to the terms of the original CBFM contract. If DENR's objective is sustainable land use, then the only terms of the contract should be environmental protection. DENR has a responsibility to monitor the protected areas, and damage to the adjacent and withdrawn areas previously identified as environmentally risky is the only grounds for DENR voiding a contract.

In addition, DENR can assist its own objective of sustainable management by providing extension-like forestry advice. If this advice is provided with the intention of satisfying the land user's objectives, not the forester's notion of "good forestry," then technical assistance

Figure 4. The CBFM Trust Fund ~ and Other Potential Forest Revenues



will help build local goodwill and insure better protection of those environmentally critical areas which DENR withholds for its own management.

The basic CBFM documents require payment of log fees equal to twenty percent of the gross receipts plus a Trust Fund composed of an additional thirty percent of gross receipts from sales of forest products. The Trust Fund would be used to reimburse DENR's costs and the costs of an AO, and also to provide a source of revenue for approved local investment. We believe that the Trust Fund constrains local management and is unlikely to recover many DENR costs. Together, these two fees amount to  $[0.2 + (1.0-0.2)(0.3)]$  44 percent of gross receipts, a huge fee for the most profitable venture, and a totally unlikely fee for local CBFM operations in largely subsistence-level communities.

In terms of Figure 4, any management restrictions, including restrictions on use of the Trust Fund, raise local costs to  $c'_x$  or reduce market opportunities to  $p'_f$  in a location which we already know to be financially marginal. Extracting 44 percent of the sale value of forest products is almost sure to remove all remaining financial incentive, therefore all incentive for sustainable management and all opportunity for DENR cost recovery, from many remaining CBFM opportunities.

Figure 4 describes the case of those CBFMs that might still retain some financial incentive after the removal of these fees. Costs are higher by the expenses for hiring an AO, completing an inventory and a management plan, etc. Prices are also lower due to government constraints on acceptable activities, including constraints on log shipment. The basic twenty percent fee ( $p'_f - 0.8p'_f$ ) is removed (the larger shaded area) and a second fee equal to thirty percent of remaining receipts ( $0.8p'_f - 0.56p'_f$ ) is removed (the smaller shaded area) to create the Trust Fund. This Trust Fund must cover all previous DENR costs, plus an additional charge for scaling logs and collecting the log fee. The local holders of the CBFM rights now have an incentive to illegally log the entire area between E" and E. Obviously, this is not a desirable outcome for the holders of CBFM rights or for DENR cost recovery, and it explains our preference to minimize these fees and to rely on a single basic charge for land use rather than log fees and a Trust Fund.

In sum, our recommendation is to keep both the CBFM contract and its oversight as simple as possible, to minimize DENR costs, and to leave as many incentives for sustainable local management as

possible—but to withdraw and protect the most risky environments. Where sufficient local interest allows, DENR might auction the land use rights and collect the auction proceeds to cover its local costs, but we do not anticipate that the receipts from any particular auction will be substantial. DENR must always remember that CBFM is designed for cases where DENR's enforcement ability has always been limited and where local inhabitants are well-identified with the resource.

### **Recommendations for Industrial Forest Management Agreements**

The objectives of IFMA are a) the collection of forest rents—or the government's constitutional "production share"—and b) environmental protection or sustainable management. There is no equity objective within IFMA. The lands within an IFMA may include degraded forests, forest plantations, and productive residual forests but formal distinctions among these land use classes are unnecessary because they do not help satisfy these basic IFMA objectives. They only raise DENR's costs for assessing the differences and create incentives for private operators to misclassify their lands.

Once more, the basic problem is to identify the IFMA boundaries and the environmental risks within these boundaries. Once more, there is no need for the standard forest inventory, but an assessment of environmental risks will be useful. Public participation can assist in identifying boundary conflicts and environmental risks. The most helpful formal public participation activity would focus sharply on these two issues alone.<sup>11</sup>

DENR may choose to withdraw the areas of environmental risk from the IFMAs—as we recommended for CBFMs—or it may choose to leave these areas in the IFMAs while establishing standards for their management and monitoring performance. The environmental

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11. The current IFMA documents allow the 28 existing TLAs to transfer their old TLAs to IFMAs. Transfers can be accommodated with our recommendations by allowing the possessor of the old TLA the right of first refusal at the auction's high bid price.

12. The current IFMA documents allow the 28 existing TLAs to transfer their old TLAs to IFMAs. Transfers can be accommodated within our recommendations by allowing the possessor of the old TLA the right of first refusal at the established fee or, in the event of an auction, at the auction's high bid price.

bond referred to in the current IFMA documents was designed to protect against environmental non-compliance. For the bond to satisfy this objective, it must be set at a level that would recover DENR's costs of rehabilitating the environment in the event of non-compliance. Assessing the bond value will require a DENR assessment of the IFMA site. The bond value will be a function of the erosion control or reforestation or other activities specific to the particular IFMA and necessary to restore that environment if the private operation defaults on its contractual obligations. Therefore, each IFMA bond would be set at a different level, and DENR would collect the bond only in the event of default on the contractual environmental performance with respect to contractually identified environmental risks.

The government does not receive its "production share" from the bond. The government's production share comes from payment for the use rights to land within the IFMA boundaries (and subject to management constraints for the areas of environmental risk). The payment need not distinguish between degraded, plantation, or productive residual forest because private bidders will make their own assessments of the values of each, and they will bid more where the land or standing residual forest are more valuable. Thus, we recommend both an environmental bond and also a fee for the land use rights.<sup>12</sup> Their values are unrelated and each is unique to any particular IFMA. The bond would not be collected except in the event of environmental non-compliance. The land use fee is the government's production share (corresponding to RA7161 requirements) and it would always be collected.

DENR may choose to set the land use fee, or it may choose to set a minimum bid price at which an auction begins and it may choose to withdraw any offers for which there are an insufficient number of bidders. In the latter event, DENR must ask itself whether the sparse number of bids was because the particular IFMA is financially unattractive at the minimum bid price, or whether redrawing the boundaries (perhaps dividing the IFMA into multiple smaller IFMAs) would attract more bids.

In any event, the optimal IFMA size from the perspective of DENR has to do with balancing maximum recovery of the government's production share against DENR's continuing cost of environmental monitoring. The optimal size for private management will change as time passes and forest values change. DENR will assure itself of the

highest-value land uses and the greatest receipts from land use fees if it permits IFMA transfers, in whole or in part, to any operator willing and capable of honoring the initial contract, including the bond on environmental performance.

The large backlog of areas currently eligible for IFMA consideration might lead DENR to consider the sequence in which it awards its IFMA contracts. All IFMA contracts cannot be negotiated immediately because the boundaries and environmental standards for some have yet to be established. Those potential IFMAs which might be most responsive to environmental improvement might be bid first. Those areas where the presence of large private operators might exercise useful controls on illegal local uses might also be bid early. Those IFMAs with internal areas of large environmental risk and those which might provide inadvertent access to areas of adjacent environmental risk might be delayed. For example, DENR might delay negotiating an IFMA that is adjacent to an old growth natural forest preserve and which would provide the only access to that forest. The delay would extend the period of limited access and greater protection for the old growth reserve.

Subsequent to awarding the contract, DENR's only responsibility, albeit a critical responsibility, is to monitor environmental performance on the risky sites within the IFMA according to the standards for those sites laid out in the contract. A good private operation will create a management plan for its own purposes but DENR approval is necessary only for that part of the plan addressing the sequencing of environmental improvements like contractual reforestation requirements. DENR does not need to impose an annual allowable cut (AAC) restriction because we know it probably cannot monitor such restrictions successfully, and because the reason for the AAC restriction is to protect the environment. Specific environmental objectives would be accomplished more directly with contractual obligations and with DENR's own more focused environmental monitoring. There is no reason for periodic reviews of any IFMA beyond the regular environmental monitoring and the review DENR would initiate itself upon evidence of environmental non-compliance.

The result of our package of recommendations should be a simpler process for granting IFMAs and also a simpler and more focused process for monitoring their performance. This means lower DENR costs, lower costs for the private operation, greater investor incentive, greater confidence in the long-run reliability of the process,

and an improved likelihood of long-term and sustainable forestry investments. The financial expectations of the private operator will be greater for all of these reasons, and the government fees will also be greater. An improved climate for private operations is important. Many of the 227 IFMAs approved since 1992 have not been implemented because they could not obtain financing. Meanwhile, DENR's responsibilities are also simplified to emphasize environmental protection and this too should improve accomplishment of that basic objective.

### **CONCLUSION: A NEW ROLE FOR THE DENR AND ITS FORESTERS**

Our recommendations all point to a reinforced role for DENR foresters as protectors of the natural environment. DENR's role in the full range of forest management and especially timber management activities would decrease, but its revenue recovery would increase and its role as an environmental monitor and enforcer would expand. The public would probably respond well to this idea. The private operators of CBFMs and IFMAs would also respond well so long as DENR is consistent in its environmental decisions.

Environmental risks are pervasive, but the DENR's resources are limited. Therefore, DENR should focus its environmental monitoring and enforcement resources on areas that satisfy the combined criteria of a) great risk and b) potential DENR impact. Selecting areas that satisfy one without the other would not be very useful. DENR managers would do well to remember this rule when removing risky sites from CBFMs and when selecting environmental standards for risky areas within the IFMAs.

We have shown that many forests and degraded natural environments will remain open access areas subject to unsustainable land uses (region B' to E in our Figure 1), and that DENR would be unlikely to alter this fact without bringing an inordinate level of resources to bear on the problem ( $c_r'$  in Figure 1 is too high). DENR's best option is to select the most threatened and riskiest environments within this range of open access, and also the most important environmental resources in the neighborhoods of current logging and other forest removal (points D or E in Figure 1). It might choose to maintain a list of those environmentally critical locations that may be

within its abilities to monitor and enforce. The list would change with time but the act of thinking about the choices on the list would gain public good will and alert the worst potential violators.

DENR can shift some of its field personnel away from responsibilities for forest inventories, timber management plans, log scaling, and log fee collection. These personnel can assist with the agency's expanded environmental monitoring and enforcement responsibilities, and they can gain local goodwill or the agency by providing technical assistance in local communities where agroforestry has potential (point F in Figure 1).

Finally, central office personnel can participate as well. They can search for ways to decrease the costs of transferring and administering the land use rights ( $c'$  in Figure 1) to CBFMs and IFMAs, and thereby decrease one part ( $B'-B$ ) of the area of unsustainable open access. The policy office in DENR can participate by identifying macroeconomic policies and policies that favor other sectors of the economy but spillover to affect forestry, or to send migrants to the uplands and, in either case, destroy forest environments. DENR has an important stake in the macroeconomic and ex-sector policies that affect forestry. This stake is not commonly recognized by the European and North American forest ministries, but it is important for many developing countries where these policy spillovers can have critical impacts on the forest environment. The DENR Secretary and policy makers outside of DENR need to understand these issues better in order to help us all protect the upland environment.

The satisfaction to be obtained from this renewed environmental role for DENR's foresters would come from its formative rather than reactive character. It reclaims the position of foresters as environmental managers and it serves the Philippine public well. These are the reasons most foresters entered the profession, and they are the reasons that many of them chose public service. It is a role that fits them well.

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