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AGRICULTURAL POLICY ANALYSIS PROJECT, PHASE II

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Assisting AID Bureaus, Missions and Developing Country Governments
to Improve Food and Agricultural Policies

Prime Contractor: **Abt Associates Inc.**

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A POLICY TAXONOMY AND ANALYSIS OF POLICIES AFFECTING NATURAL RESOURCES AND THE ENVIRONMENT

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Regional Environmental and Natural Resource Project (RENARM)

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PREFACE

This work has evolved from a series of activities supported by the Policy Initiatives component of ROCAP's (Regional Office for Central American Programs) Regional Environment and Natural Resources Management (RENARM) Project. Through buy-ins with the Agricultural Policy Analysis Project, Phase II (APAP II) policy inventories were performed in Guatemala, Belize, Honduras, El Salvador and Costa Rica from 1989 through 1990. Subsequent work, represented in part by this document, attempted to draw lessons across the five countries and present information which can aid Missions and local decision makers in improving their understanding of the natural resource and environmental consequences of a broad array of policies. The document is taken from "The Green Book: An Environmental Sourcebook" produced for ROCAP/RENARM. The objectives of this work include: (1) promoting participation in natural resource policy formulation; (2) increasing the quality and use of information and analysis; and (3) building the institutional capacity for policy formulation and dialogue.

This work has had the strong support of individuals whose ideas and energy have contributed to the structure and evolution. Ronald Curtis, former ADO for ROCAP, contributed significantly to this project, especially the articulation and development of the sections which analyze the trade-offs between economic growth, welfare, and the environment. Bill Sugrue, current ROCAP ADO and RENARM Project Officer has been an enthusiastic supporter even when the vision was a bit murky. The Development Strategies for Fragile Lands (DESFIL) Project helped to get us over the finish line. Chris Behr and Rosemary Hyson provided much needed research and management support to this effort.

This analysis draws on research performed by APAP II in Central America as well as the body of existing research analysis on these natural resource and environmental policy issues throughout the world. It attempts to summarize this research and analysis without being superficial. Without the efforts of those cited this work would not have been possible. Nevertheless, much more research and thought will be needed before we fully understand policy and resource interdependencies.

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INTRODUCTION AND GUIDE TO USE OF THE TAXONOMY AND ANALYSIS

This document is organized around the foregoing policy taxonomy. The taxonomy shows the broad range of policies which must be considered when addressing resource issues, not solely resource specific policies. For example, macroeconomic and tenure policies are often of equal or greater importance as forest specific policies.

The taxonomy was developed to facilitate comparison of policies across five countries in Central America. The initial information base was composed of the natural resource policy inventories of Guatemala, Belize, Honduras, El Salvador and Costa Rica that were prepared by USAID's Agricultural Policy Analysis Project, Phase II (APAP II). However, the taxonomy structure and analysis were drawn from policy analyses and documents worldwide. The rationale for this approach is based on the premise that more similarity exists across regions for policy issues and analysis than one might initially expect. Thus, regional policy issues and solutions have useful insights and applications in other areas of the world.

Since this methodology for analysis is still evolving, a rather loose or "rule-of-thumb" definition for policy was chosen. A policy is what various decision makers focus on when trying to deal with economic, welfare or environmental problems. Thus a policy can be a specific law, rule, or a broad property and/or market system which controls access to resources. Further refinement of categories seemed counterproductive at this point although the definition is clearly not rigorous. The categories in the taxonomy are, however, common topics around which policies are discussed. At times duplication of analysis occurs because some topics, such as livestock policies, are aggregates of policies discussed elsewhere but also bear reiteration within this specific context.

The taxonomic structure is linear. This has both advantages and disadvantages. Analysis can be summarized easily and displayed in various accessible ways. Much information fits into this format. It is important to recognize the wide scope of policies which must be considered. While some

issues such as energy and trade and investment policies were not developed in this document, the scope and flexibility of the taxonomy format will allow for later inclusion of these categories as well as others. More importantly each section can be revised as we learn more about the complexities of the policy analysis, reform and implementation process.

The analysis involves estimates or probable outcomes given certain conditions. It is not deterministic. Other policies and changes in those policies will often obviate a specific conclusion. Geographic or regional issues will also influence the final outcome of the analysis. Therefore, this information must be used as a framework that requires careful application to specific circumstances. As more is learned about those interactions, information can and will be added to the base. The framework's linear format, however, will impede the ability to include all nuances. In addition, the context and problems will affect the relative importance of a particular policy or set of policies. This will affect any given set of policy reform prescriptions.

The information presented here uses a minimum amount of jargon but often deals with complex ideas. This is a tricky balance to maintain and some sections are more successful than others. The detail presented in some sections can lead to the design of specific reforms or research prescriptions. In addition, some information is summarized differently in an evolving experimental process to see what works and what does not work. The intent of each of the types of summary information are explained below. This taxonomic format functions much as an encyclopedia but with different strata of summaries.

A primary disadvantage to this structure is that policy solutions for particular problems must deal with the dynamic interaction between and across policies and problems. Solutions are unlikely to be linear or draw from only one policy category. Taking account of the broad array of policies was one of the primary reasons for creating the taxonomy. In future editions, the taxonomy will of need include a highly articulated index allowing exploration of various policy alternatives.

The taxonomy provides the overall outline for this document. Within most of the policy discussions one will find a common set of subsections. The purpose of these subsections is briefly explained below and will serve as a guide to using the taxonomy and analysis.

Key Points

Key points are bullets derived from the more detailed analysis which appears in discussions of sub-groups of policies. They are intended as a quick reference so that the reader can determine the applicability of this section to the problem being addressed.

Likely Impacts of . . .

Likely impacts of a given policy are presented so that the broad trade-offs between economic growth, welfare and environmental effects can be viewed in a summary form. Policy choices invariably result in trade-offs, particularly between short term and long term goals. This format attempts to capture these analytic issues but caution should be taken when applying to specific contexts which often are more complex.

Topic - Text of the Analysis

These sections, though not labeled analysis per se, are the core analytic summaries in the taxonomy. The information is drawn from analyses both specific to the Central American region and other regions. The analysis should be broadly applicable to other countries and regions, though some adaptation will be needed. As additional learning occurs, we expect to revise these sections as well as the Key Points and Likely Impact sections derived from this summary analysis. Implementation issues are also an important feature to the analysis.

Mini-Case

These cases are used to illustrate a specific policy situation or solution. They are draw from many regions and countries. As the format is refined, more cases will be included.

Cross Policy Analysis

This analysis is a problem related attempt to break down the linear structure of the taxonomy. It attempts to draw the most important policies into a problem solution. The analysis can suggest cumulative, conflictive, complementary and sequential policy interactions.

Research Questions

While we primarily draw from existing information, theory and knowledge in the analytic summaries, this work also can be useful in identifying what we yet need to understand in order to improve our ability to solve policy problems. The research questions are designed to specify some of those questions as well as identifying information we will need in order to apply the existing knowledge base.

Reference

The analysis here is often drawn from important work done by other researchers in other regions and countries. These references are important sources and the reader should draw from these sources if more detail or exposition is needed.

This is an idea and work in progress. It will always be so. It is designed to change as we learn both about policies and ways of communicating that information. The taxonomy itself will change and the analytic content will most certainly do so as well.

FOREST MANAGEMENT POLICIES

Concessions for the Use of Public Timber

KEY POINTS

- **Timber concessions on public lands are too short and/or too insecure to provide an incentive to manage the natural forest. For a long-rotation species, it is likely that the user will not be able to recoup his investment or even be able to return for a future harvest. This situation results in resource mining.**
- **If the costs of extraction are much less than revenue (i.e., when there are excess profits or large economic rents), the length of the concession is not likely to be a determining factor in resource management decisions.**
- **Management plans with specific controls on forestry practice are often ineffective because they cannot be policed.**
- **The concession award process encourages nonprice competition to get the best sites and is often the source of corruption.**

Forest or timber concessions are agreements between governments and the private sector that allow for and attach conditions to the harvesting of timber from public lands. The primary features of a concession include its duration, conditions on amount of harvest and harvest methods prescribed or proscribed, associated fees and the procedures for awarding, managing and monitoring the concession. The forest type (pine versus hardwood) and condition (untouched versus degraded) are important in the analysis and determination of specific attributes of the concessions.

LIKELY IMPACTS OF LONGER TIMBER CONCESSIONS:

Growth

- Short-term loss of log exports as long-term management practices are established which result in a more sustained production pattern.
- Increased government expenditures to properly manage the forest resource in order to ensure compliance with concession terms.

Welfare

- Long-term employment from sustainable resource management system.
- Loss of income from short-term resource exploitation.

Conservation

- Greater long-term wildlife biodiversity.
- Slower conversion of forests to other land uses as a result of increased economic utilization of forest for the long haul.

DURATION OF TIMBER CONCESSIONS

Short-duration timber concessions do not provide the resource user an incentive to invest either in the relatively long-term activity of restocking forest resources or in modern, efficient processing industries.

Concessions of 75 years are often recommended by foresters in order to capture more than one cutting cycle; however, such concessions seldom exist. The recommended cutting cycle depends on the forest resource; however, there is little information on growth rates for the large number of species in tropical hardwood forests.

In many developing countries, concessions are too short or too insecure to provide an incentive for regeneration and sustained use of resources. The consequence is that the tim-

ber resource is mined (extracted once with no replanting) for short-term economic benefits and the land opened for inappropriate uses.

The length of the concession is not the only critical factor. If revocation of the concession is arbitrary or subject to political or other changes, the length, per se, is not as relevant. Where other incentives favor short-term resource use, the length of the concession is not as important because resource mining to extract the economic profits over-rides the benefits for long-term gain.

There is little evidence that longer concessions alone will change resource-mining behavior. Nevertheless, a longer concession, in conjunction with other policies encouraging longer-term investments, would be a move in the correct direction.

Short-term concessions and/or insecurity of concessions result in short-term economic and employment gains but with resulting long-term diminution of the resource base because the gains are not reinvested in long-term production. This reduces the growing stock.

The small proportion of species and volume traditionally utilized makes it difficult to justify forest management investments. Vertical integration of the industry and differentiation of forest products to use a wider range of species will complement other mechanisms to provide security of timber tenure and supply.

CONDITIONS AND RESTRICTIONS ON TIMBER CONCESSIONS

Conditions and restrictions for the granting or the continuation of timber concessions may include requiring management plans and establishing permissible annual harvests, prescribed or proscribed harvest methods and species and size cutting restrictions.

The information base of such plans is highly variable. Compliance with plans is highly variable both within and across countries. Variability can result in uncontrolled resource exploitation or better performance depending on the policies adopted and the effectiveness of their implementation.

What is required for sustained resource management of humid tropical forests is not well understood. Caution is therefore advised in terms of the level and type of forest activities permitted. Several types of restrictions are common.

Permissible annual harvests mandate a certain timber off-take for the concession area in sustained use; however, scarce growth data make calculation of the off-take difficult. The details of the plan can either discourage or encourage the use of secondary species. Often high-grading or creaming of mahogany and cedar or other valuable species will occur if plans do not expressly address the issue.

Diameter limits that indicate minimum size for cutting can reduce long-term stand potential by selectively reducing the best genetic material. Faster-growing trees will eventually be replaced by slower-growing trees.

Mandated selective-cutting practices of any kind require monitoring by professional foresters. When enforcement is lacking, short-term economic incentives will condition economic behavior. Most selective-cutting systems result in heavy incidental damage. If the stand is creamed and not opened sufficiently, regeneration will tend to be inadequate.

Time limits requiring that cutting begin within a certain time period have been designed to prevent hoarding and increase short-term revenues for the government. It may be the case that time limits, while proving use and thereby inhibiting land invasions, are also inconsistent with sustained resource use.

Restrictions, prohibitions and quotas of endangered or valuable species are difficult to enforce and the fines too small to compensate for the large returns to high-demand species.

Restrictions on harvesting marginal areas limit concessionaire activities in areas of the concession that are considered inappropriate for sustained forest production.

A management regime that encourages high-grading reduces the long-term economic viability of the resource. The issue, however, can become more complex because few options exist for such selective-cutting systems. Clear-cutting may be too detrimental to soil conditions to allow for appropriate regeneration. Selective cutting, if not followed by agricultural and cattle operations, as it often is, will at least keep some of the forest cover.

The short-term winners will be those powerful enough to get a concession and cut the high-value species. The losers will be future generations of resource users and those, like indigenous peoples, currently dependent on the forest resource for their livelihood.

AWARD PROCESS FOR TIMBER CONCESSIONS

Concessions are usually awarded noncompetitively. The concessionaire selected is not necessarily the one able to pay the highest price and/or produce more efficiently. Concessions are often used to reward political victors or the military. Because forests have been viewed as unlimited, concessions have been too easy to get as old ones are depleted.

Awarding concessions noncompetitively encourages rapid resource depletion because of the potential to allow capture of the economic rent by sectors with political influence who do not pay the government and who view the resource as a short-term source of (unearned) profit.

Open competition would increase revenues to the state and also reduce the rush to get the best sites if it were conducted on a first-come, first-served basis. Concession systems should be defined so as to account for oligopolies that often dominate industrial activities. Competitively bid concessions can establish minimum bids to help capture some of the excess profit.

Alternative Forest Charges

This discussion of revenue systems relies heavily on John W. Gray, *Forest Revenue Systems in Developing Countries: Their Role in Income Generation and Forest Management Strategies* (Rome: Food and Agriculture Organization of the United Nations, 1983). For a more complete treatment of this subject, see this excellent reference.

KEY POINTS

- **Low royalties and stumpage fees have reduced government revenues to the benefit of concessionaires. When stumpage values are low the government does not capture much of the economic rent. Rent-seeking has resulted in over-rapid, wasteful exploitation, including the harvesting of marginal timber stands, often in ecologically vulnerable sites such as slopes and critical watersheds.**
- **Low cutting fees on public land can depress stumpage prices on private land and reduce or negate returns to long-term private investment in forestry.**
- **Charges are often based on the volume of timber removed, not the volume of merchantable timber in the tract, resulting in high-grading. If sawmills buy wood on the truck, only the best logs will be harvested. It is difficult to measure trees on the stump and to control quality of inventory, and the potential for corruption is high.**
- **Flat charges or taxes are fixed amounts based on units (per cubic meter). Unless finely differentiated by species and location, flat charges encourage high-grading.**
- **Ad valorem taxes are percentages based on value and flat taxes are fixed amounts based on units. Undifferentiated ad valorem taxes can result in greater forest destruction than can differentiated taxes.**
- **Both flat taxes and ad valorem taxes could be differentiated by species. However, differentiated rates are difficult to administer because of the large variety of species in tropical forest stands.**
- **Sale of timber on the stump has the advantage of less waste since the concessionaire purchases the**

entire tree. However, such sales are more difficult to administer and require professionals to do forest inventories, mark trees and carry out the bidding process.

- **Relatively lower taxes on secondary species could provide incentives for utilization.**

LIKELY IMPACTS OF MORE PUBLIC REVENUE FROM TIMBER CONCESSIONS:

Growth

- Greater ability of government to manage resource for long-term economic goals.
- More incentive for efficient management and resource utilization.
- Increased incentive for high-grading if there is a flat, undifferentiated tax structure.

Welfare

- Efficient plants will require fewer workers than inefficient ones.
- Forest charges will increase the value of standing timber, stimulating the industry to become more efficient in terms of vertical integration and diversification of its products. This will increase long-term employment opportunities.
- Increased ability of the public sector to provide services.

Conservation

- Reduced pressure to get rich quick and to manage the resource by more efficient firms.
- Better management of the resource by those committed to long-term management will strengthen forestry's position vis-à-vis other competing land uses.

In the short term, deforestation trends increase timber supply and keep prices from rising to reflect scarcity value. In the long term, deforestation leads to scarcity of timber and higher prices. Gray (1983) notes that forest revenue systems must be able to respond to sudden timber scarcities and substantial increases in timber prices and stumpage values.

Forest concessions provide security of supply at established forest charges, security for expansion of processing plants and bargaining power in obtaining additional timber. Gray (1983) suggests that charges on concessions should reflect this additional value to the industry, which is in addition to the value of the timber.

Forest charges complement management activities and contribute to increased economic efficiency. They can influence rate of harvesting, the areas harvested, species cut and level of utilization, and help to discourage creaming or high-grading of stands (Gray 1983).

Stumpage charges can be set to reflect the scarcity value of the forest or of specific species. Raising stumpage charges then leads to a slower rate of harvesting. Low forest charges result in higher profits, and logging firms will expand their activities. Higher forest charges lead to lower profits, and firms will be less inclined to expand. When charges are high enough to reduce profits to below normal levels, logging firms will not replace equipment and will retract logging activity.

Charges can also influence the areas harvested. Overcutting of near or readily accessible areas is the result of charges that do not reflect the differentials in stumpage value with respect to distance and accessibility. Overcutting can be remedied by forest charges that differentiate by distance.

Charges can be adjusted to encourage the utilization of certain species or grades. When charges do not fully reflect differences in stumpage value between species or grades, they encourage the overcutting of more valuable timber and the undercutting of less valuable timber, counter to standard forest-management objectives.

If economic rent is not completely captured by the government, windfall profits exist for the forest user. Under these conditions, little incentive exists for long-term forest resource management either by the direct user or by the government as a source of long-term revenue.

To the extent possible, charges should reflect the stumpage value of the timber cut and the value of the concession. Establishing the stumpage value and the associated economic rent is not easy. Most countries have an ad hoc taxation system that fails to capture a significant portion of the economic rent for the government. The focus of most countries is on revenue generation, with no consideration of the effect of the tax on resource management.

The government can also collect revenue through joint ventures, full ownership or participation in concessions, harvesting, processing and marketing.

Revenue can be collected from companies and concessions in the form of a corporate income tax or profit-based royalties and from fees levied on concessions. Examples are license fees, annual ground rentals, and fees on:

- standing timber;
- timber harvested, as per-tree charges;
- volume and/or area charges;
- forest products, as charges on processed products and minor products;
- foreign trade, as export charges on processed products;
- services provided; and
- the productive factors, such as equipment and workers.

Assessing the cumulative effects of revenue measures would require a detailed analysis in any given country.

CHARGES ON CONCESSIONS

License fees on concessions

Base: A lump sum paid at the initiation of a concession or on an annual basis. The fee is usually set administratively, but it could also be set by auction of concessions or competitive bidding.

Revenue: Usually low. Potentially significant. Can reflect the value of the concession if set by competitive bidding.

Administration: Easy to administer either as an initial or annual fee. Compliance is easy; evasion, low.

Efficiency: Charges that reflect the value of concessions will discourage the accumulation of large areas. Charges should at least reflect the economic value of alternative uses of the areas.

Distribution: Primarily involves distribution of revenue between concession holders and the government.

Suggestions: There is scope for greater use of license fees or other concession charges to reflect the value of concessions.

Annual ground rentals

Base: Area of the concession. Annual payment usually administratively set, but could be set by auction of concessions or competitive bidding.

Revenue: Usually low. Potentially significant. Can reflect the value of the concession if appropriately set.

Administration: Easy to administer. Compliance is easy; evasion, low.

Efficiency: Low ground rentals can encourage the acquisition of large concession areas. Higher rates discourage excess accumulation and encourage better use of existing areas. Minimum ground rentals should reflect the economic values of alternative uses of the areas.

Distribution: Primarily involves the distribution of revenue between concession holders and the government.

Suggestions: Annual ground rentals can reflect the value of concessions and can be used in conjunction with charges on the timber cut where feasible. Competitive bidding for concessions can serve to set rates.

Charges based on standing timber volumes

Base: Annual allowable cut, the inventory volume of timber on the concession, or the assessed value of the concession and timber.

Revenue: If these bases match the value of concessions better than area-based ground rentals, they could theoretically be better revenue sources. In practice, they are unlikely to be much better, if better at all.

Administration: Difficulties and uncertainties of forest inventories, allowable cuts, or valuations make this type of charge impractical for most situations.

Efficiency: Charges based on volumes, or property values, may encourage rapid liquidation of mature timber. Alternatively sufficiently high charges may encourage concession holders to relinquish excess area.

Distribution: Primarily involves the distribution of revenue between concession holders and the government.

Suggestions: Not recommended for most countries. Ground rentals are simpler.

CHARGES ON TIMBER HARVESTED

Per-tree charges

Base: Per-tree charges are on the number of trees cut. The charge usually varies by species but not by tree diameter. The charge, which is administratively set, is often levied prior to harvesting.

Revenue: Per-tree charges cannot easily reflect variations in stumpage values of timber cut. Their advantage is that they can be collected prior to harvest.

Administration: Easy to Administer. Problems and costs of scaling the volumes cut are avoided.

Efficiency: Per-tree charges encourage full utilization of each tree cut but can result in smaller trees being left, unless charges vary with diameter. Charges are often not varied sufficiently among species to fully reflect stumpage values, resulting in overcutting of more valuable species.

Distribution: Inequities may result, with more benefit to those cutting larger trees or the most valuable species.

Suggestions: Per-tree charges should be used only if ease of administration is an important consideration.

Volume-based charges

Base: The measured (scaled) volume of timber cut. It includes stumpage fees, royalties, reforestation fees, silvicultural fees, etc. Fees can vary according to considerations, including species, log grade or product values, distance, and location. This is a major forest charge in many countries. It can be administratively set, value-related (ad valorem), formula-based, negotiated, open-bid and sealed-bid auctions.

Revenue: Substantial if the charge is set to reflect stumpage values and adjusted to changes in costs, prices and inflation. More sophisticated and complex charges may better reflect stumpage values and collect more revenue, but administration is more complex and costly. Charges often do not reflect the full variation in stumpage values between species; charges for higher-valued species do not approach their full value.

Administration: A single, uniform charge is simple to administer. The variation of charges for several factors complicates administration and encourages misclassification into lower-rate classes. Wood measurement is demanding of manpower and costly and may be subject to abuse and under-scaling.

Efficiency: Volume-based charges can discourage cutting of lower-valued, marginal timber. This incentive is counterbalanced, however, by the low marginal costs of logging extra timber. Charges that are uniform, or that do not fully reflect stumpage values, encourage cutting of the more valuable species, grades, etc., or nearer timber. Charges that reflect stumpage values accurately provide an equal incentive for cutting all timber and assist forest management.

Distribution: If charges reflect stumpage values, the value is collected by the government; if not, values are distributed to concession holders or timber buyers.

Suggestions: Volume-based charges should be an important component of a forest revenue system. Charges should be set to reflect differences in stumpage values among species, etc., and adjusted for changes in prices, costs and inflation.

Charges based on area logged

Base: The timber in a given area rather than a unit- or volume-based charge. Lump-sum timber sales are one version in which timber is sold by auction. Payment usually precedes cutting. Administratively set or established by auction, but other methods are applicable.

Revenue: Theoretically, could yield slightly greater revenue than volume charges, but in practice, with uncertainty about timber volumes or the value of the timber involved, revenues are likely to be somewhat lower than those raised by volume-based charges.

Administration: No scaling required of timber cut, resulting in a substantial savings in manpower and administrative costs. A detailed timber survey may be required to reflect timber values, or on lump-sum timber sales to reduce uncertainty of bidders.

Efficiency: As no additional forest charges are paid in cutting marginal species and trees, utilization is encouraged. The charge is suitable for clear-cutting or salvage log-

ging. Charges should vary with stocking of stands to discourage cutting of the best.

Distribution: A uniform charge per hectare can be inequitable to companies cutting poorer stands.

Suggestions: Area-based charges have advantages of administrative simplicity and of fuller utilization. They could be more widely used where clear-cutting and utilization are to be encouraged, where timber surveys can be accurate; and where competitive bidding can be encouraged.

CHARGES ON FOREST PRODUCTS PRODUCTION

Base: The volume or value of the processed products output rather than the timber cut. This can be a per-unit charge or an ad valorem (percentage of value) charge. It can be administratively set, ad valorem or established by formula.

Revenue: While charges on products instead of logs may be able to reflect prices, recovery, log grade and defect, they do not reflect logging factors or distance. Charges on products can complement charges on logs, but the two must be coordinated. Charges on products that supplement charges on logs, if significant, can discourage domestic processing.

Administration: Measurement of products may be easier than scaling of logs and can also serve as a cross-check on log volumes.

Efficiency: Standing timber is treated as a free good, so recovery and utilization are less efficient. Near stands and better stands are overcut. However, charges on products that supplement charges on timber as a part of a two-part charge may together reflect stumpage values.

Distribution: The structure of charges can be used to influence the product mix, employment, regional impacts, etc. However, charges on products can encourage log exports, unless matched by equivalent charges on export logs.

Suggestions: Charges on products should replace charges on logs only where there are administrative benefits, as they can have undesirable effects on utilization or forest management. However, such charges can usefully serve as part of a two-part charge on timber and products, if carefully coordinated.

Charges on minor forest products

Base: Either the products themselves or the firms and individuals producing them. It can be either a per-unit or a value-based charge and can be administratively set or ad valorem.

Revenue: Usually low, or even token, to avoid evasion problems, and for income-distribution reasons.

Administration: With many, scattered, small producers, administration is expensive. A simple system is needed. High charges encourage evasion.

Efficiency: Although low charges may contribute to overcutting, higher charges would not reduce overcutting, but encourage evasion. Other, noneconomic policies are better solutions to overcutting.

Distribution: Low charges can encourage production and job creation, save foreign exchange (e.g., fuel wood) and benefit the low-income rural population.

Charges on foreign trade (Export charges on logs and products)

Base: The volume or value of logs or processed products. Export charges are often used in place of volume-based charges on timber cut. This type of charge is frequently used to encourage domestic processing. It can be a per-unit or an ad valorem charge and can be administratively set, value-related or formula-set.

Revenue: Export charges on logs are the major forest revenue source for many countries. Charges can be based on world market prices. Raising rates on logs brings in more revenue or encourages domestic processing—which both benefit the country. Export charges on processed products are usually low since high charges would discourage processing.

Administration: Export charges are often easier to administer than volume-based charges on the timber cut because they are collected at export ports and are based on more readily measured volumes and values. If export charges are a significant part of export prices, they may encourage underreporting of volumes or FOB values. Charges can be based on posted export prices to prevent underreporting of FOB values of shipments. Export charges may also encourage misreporting of species and grades, especially if they attempt to reflect differences in stumpage values.

Efficiency: Export charges on logs can serve to influence forest management and utilization in many of the same ways as volume-based charges. They can be varied by species and log grade, and perhaps distance or region as well. Because they are a significant charge, export charges on logs can generate sizable incentives for domestic processing. These incentives are larger on more valuable logs because of their higher export charges. Export charges on processed production reduce the incentive for domestic processing, but since charges on products are usually low, the effect is minimal.

Distribution: Export charges that stimulate domestic processing can generate employment and income, influence product availability and prices, and positively affect foreign exchange earnings and government revenue.

Suggestions: Export charges on logs, which can serve as a substitute for volume-based charges on timber cut, can be effective revenue sources. Export charges on logs can also serve to encourage domestic processing. However, export taxes alone cannot achieve both objectives. They should be coordinated with other forest charges on logs and with export charges and other charges on processed products. High export charges should be used instead of quotas or domestic-processing regulations.

CHARGES FOR SERVICES

Fees for service provided

Base: Services such as applications, inspections, scaling, grading, port charges, etc.

Revenue: Not a major revenue source, nor should it be. Fee should merely cover costs.

Administration: Fees should reflect costs and be adjusted for cost changes. Charges for services should be grouped into a minimum number of classes.

Efficiency: If fees reflect the administration costs, efficient use of services will result.

Distribution: If fees cover costs, they will be equitable.

CHARGES ON PRODUCTIVE FACTORS

Charges on workers and equipment

Base: On logging or processing equipment, number of workers, or payroll. Based on capital or labor inputs rather than outputs of logs or products. There is usually an annual

fee and, in some cases, an initial fee, which are both administratively set.

Revenue: Usually low, but scope exists for greater use and for higher rates.

Administration: Simple and easily administered charges. Based on readily identifiable items. Fees on logging equipment can assist in supervision of forestry activities.

Efficiency: As fixed lump-sum charges, they do not deter forest management or utilization and can encourage more efficient use of equipment. They can serve with charges on the timber cut as a two-part charge.

Distribution: Will influence the use of equipment and the substitution of labor and capital.

CHARGES ON COMPANIES

Corporate income tax

Base: The net profits of corporations after the deduction of depreciation, interest payments, etc. A corporation's net profits figure is taken from its audited accounts.

Revenue: Not a good substitute for forest charges. First, it applies to corporations only. Second, because the tax collects only 35% to 50% of profits, it can collect, at most, 35% to 50% of the stumpage value of the timber cut. Investment incentives and transfer prices of logs, or products sold, and of equipment purchased can reduce taxable profits.

Administration: Administratively easy if a corporate income tax system is already in place, but reliable accounting systems and government auditing of accounts are required.

Efficiency: Substitution of a corporate income tax for forest charges would put forest companies in a more advantageous position than other corporations, as they would receive a free input, timber, and only part of the timber value would be collected by the income tax. Over-use of the free timber input and overexpansion of timber production would be encouraged.

Distribution: Timber companies would be better off than nontimber companies following a switch from forest charges to a corporate income tax.

Suggestions: Countries should not rely on the corporate income tax as a substitute for forest charges. Corporate in-

come taxes should apply equally to all corporations. Forest companies would then pay forest charges and treat them as a cost in determining taxable profits for corporate income tax.

Profit based royalties

Base: Profits earned from the exploitation of the natural resource. Profits are defined to reflect the economic rent. The resource rent tax is a widely discussed example. Profits are defined in terms of receipts and payments (cash flow), and a normal rate of return is allowed. Profits above a normal rate of return are taxed at higher rates.

Revenue: Potentially able to capture a sizable proportion of the stumpage value. Transfer pricing problems can reduce revenue. A major problem is that revenue is not received until the investment has been recovered—a delay that can result in political dissatisfactions.

Administration: Can be relatively easy if accounting is reliable and accurate auditing is possible. The resource rent tax can supplement and complement an existing corporate income tax.

Efficiency: It is claimed that a profit-based royalty system will not deter marginal investment. It should not distort forest utilization or management.

Distribution: If effective, it is likely to collect greater revenues from the forest industry than alternative charges.

Suggestions: The resource rent tax can conveniently complement an existing corporate income tax, collecting a sizable share of stumpage values without requiring additional administration.

GOVERNMENT PARTICIPATION IN CONCESSIONS, HARVESTING AND PROCESSING

Logging operations or processing plants

Joint ventures may take the form of equity participation, profit sharing, production sharing, or options on production. A great variety of detailed arrangements is possible. The government may own and operate concessions, or may hire logging contractors. It may sell logs or operate its own processing plants.

Revenue: Joint ventures should be able to capture a portion of the stumpage value not captured by other forest charges—the portion depending on the ownership arrange-

ments, the efficiency of the operation and the likelihood of transfer pricing problems. Full government ownership should be able to capture a greater portion of the stumpage value of the timber, either by other forest charges or as profits, provided the government can obtain world prices and can operate at costs equal to, or lower than, those of the private sector.

Administration: For joint ventures, administration can be relatively easy if the private partner undertakes planning and management. But government expertise and supervision are still required. Government ownership requires establishment of a government enterprise to operate the concession and substantial skilled manpower. Contractors can be used, but they must be supervised.

Efficiency: Advantages in pursuing forest utilization management objectives. Normal forest charges can still be levied on the operation.

Distribution: Scope to pursue income or employment objectives.

Suggestions: Can supplement forest charges but is not recommended as a substitute. A useful component of a forest revenue system, because government participation provides information on the forest industry, costs, prices and rates of return that is helpful in setting other forest charges.

Forest Industry and Export Policies

KEY POINTS

- **Log export bans and quotas encourage inefficient domestic processing industries as do other elements of high domestic protection. Such policies must be accompanied by forest management and regulation policies.**
- **Relaxation of export bans and quotas will increase the value of the resource and increase incentives for better resource management, as long as policies to inhibit resource mining exist. Resource mining will result absent such safeguards.**
- **Government parastatals involved in timber production, marketing and processing have been inefficient, and many have been divested or closed.**
- **Price controls on domestic timber have resulted in inappropriate uses of high-value species.**
- **Many export policies are established in response to the export and import policies of other countries.**

Countries often attempt to control the export of high-value timber species by imposing log export bans, species bans and export taxes that differentiate between logs and processed wood products. Other governments have become directly involved in their forest industries. Subsidies have encouraged local processing for the purpose of increasing value added. Governments have also set price controls to prevent high consumer prices in periods of supply shortages.

LIKELY IMPACTS OF FEWER CONTROLS ON LOG AND WOOD PRODUCT TRADE:

Growth

- Increased log exports and reduced processed products in the short term, if no other controls exist on resource mining.
- Short-term increase in foreign exchange for resource owners and government treasury at expense of long-term profits, also depending on other policies in place.

Welfare

- Loss of inefficient firms and associated jobs in short-term.
- In the absence of policies to ensure security of future timber sources, and raise the value of standing timber, long-term loss of income from sustained forest management.

Conservation

- Increased value of resource can result in long-term management if regulations are implemented and other policy reform also takes place.
- Increased value of forest resources may inhibit change to inappropriate resource uses.

DOMESTIC INDUSTRY/RESOURCE PROTECTION POLICIES

Log bans or quotas are established with the primary goal of increasing value added. In few cases is the goal to protect the diminishing resource. Log export bans and other policies designed to increase domestic log processing might have only short-term effects, because local industries are often inefficient and governments provide logs even when demand is low in order to keep operations going. Unless

these policies are supplemented with effective enforcement and forest management, they are unlikely to reduce deforestation.

These policies depress the value of the resource, thereby inducing more waste and less conservation. In some cases bans or quotas have been circumvented by over- and underinvoicing or illegal exportation. Bans on the export of particularly rare or endangered species are often ineffective because of high profits and corruption.

Log export taxes attempt to protect domestic wood processing industries and are also an element in government efforts to capture economic rent. Log-exporting countries often waive or reduce export taxes on processed wood as well as provide investment incentives and log export bans to counteract import restrictions by other countries.

Tax and tariff protection provided to wood-processing industries has been so high as to weaken competitive pressure and to undermine incentives to minimize costs. This has increased pressures on forest resources. Higher export taxes on logs than on lumber and plywood are superior to bans and quotas on log exports. Export taxes furnish whatever degree of protection is desired, raise government revenues and also make redundant any income tax or credit incentives for sawmills and plymills.

Local wood-processing industries have been given tax credits, import duty exemptions and accelerated depreciation. These subsidies may reduce incentives for efficient wood utilization if they are too great or last too long. Other incentives include credit lines for forest industries and preferential interest rates.

Protection of domestic (infant industries) with the purpose of increasing the value added from resource exploitation have generally had short-term benefits to the processing industry. These policies have then been extended too long and resulted in inefficient resource use. Industries created in such a way have also been supported by the willingness of governments to allow resource overexploitation in order to maintain employment levels or as support to a favored group. Efforts to reduce protection must address both employment and resource effects.

DIRECT GOVERNMENT INVOLVEMENT IN FOREST RELATED INDUSTRIES

Many donor activities have supported development of local wood and timber processing activities that are often inefficient. Timber cutting permits are issued to support local plants, and many regions have been overharvested to support local timber or wood processing plants, which often have preferred access to credit. Governments have sought to limit the role of foreign companies in domestic timber operations. This may produce processing efficiency.

Direct government involvement in forest-related industries is usually characterized by corruption and inefficiency. There currently seems to be a trend to divest these money-losing operations in Central America because they are supported by general government revenues. International credit has been directed at such parastatals without examination of resource issues.

Government operation of businesses has generally been inefficient and subsidized by other revenues. While the government is able through this mechanism to capture some of the economic rent and excess profits from resource exploitation, the benefits are not converted into long-term economic benefits. Short-term employment and revenue benefits are achieved at the cost of both short- and long-term resource depletion.

PRICE CONTROLS

Price controls on lumber products are often enacted to prevent high consumer prices in periods of supply shortage. Such controls, however, encourage the purchase of high-value wood for inappropriate uses and discourage uses of secondary species.

Price controls, if they are effective, usually exist to subsidize consumers at the cost of resource owners. This reduction in the value of the resource encourages its inefficient use and long-term unsustainability.

FOREST INDUSTRY STRUCTURE

It is argued that investment in long-term forest management will not be cost effective on an industry-wide scale until the industry utilizes forest resources more efficiently. Efficient use of forest resources will require vertical integration and a wider range of products. Policy can begin to fur-

ther these industry requirements. Possible policies include 1) more secure access to timber including purchasing forests; 2) credit subsidies; 3) fiscal incentives; and 4) joint ventures between forest owners and sawmills. It will be important to avoid creating incentives that take on a life of their own and become a transfer of resources from the public sector to a small group of individuals.

Industry returns on forest management must be sustainable in the long term. Short-term sustainable rates of return will be lower than those from unsustainable mining. Because windfall profits from forest mining can be profitably invested in a global market that is not limited by sustainability criteria, policies to prevent destruction of forest resources and to limit the opportunity for excess profits will be very important for ensuring that the industry has a long-term supply of timber.

Policies Affecting Tree Tenure and Private Forest Management

Governments have often, through direct ownership or regulation or both, established de jure control over the harvesting of trees on private land. In Honduras, COHDEFOR has been the owner of trees on privately owned land. In Guatemala and Costa Rica, regulations, often involving cumbersome paperwork, control the cutting of even a small number of trees. While these regulations are frequently ignored, the uncertainty created by this situation effectively eliminates the potential for long-term resource management. In Costa Rica, where deforestation is occurring mostly on private land, the regulations are routinely ignored. The disincentive to invest in resources over which the user has no titular control is one of the results of such policies.

Reforestation Policies

KEY POINTS

- **Fiscal incentives for reforestation have been successful in the short term but often to the benefit of wealthier groups.**
- **Reforestation projects that account for the needs of local resource users or communities are more successful than large government projects on public lands.**
- **Plantations are better targets than natural forest activities for reforestation activities.**

Reforestation efforts have taken two broad approaches. The first has focused on fiscal incentives and has included a wide range of measures including tax deductions and exemptions, subsidized inputs and deposit fees. The other approach of reforestation efforts has been large government projects on public land, often supported by donor governments. Less frequently, projects have been community or small holder focused. The success of these efforts has been mixed from an economic, welfare and natural resource management point of view.

Reforestation can mean either restoration of degraded stands to approximate their natural states, enrichment planting of primary species, or, more broadly, establishment of plantations. The incentive approaches sketched below have been used to address each of these types of reforestation. Efforts have met with little success with a few exceptions, particularly plantations. Plantations can be an important option for relieving pressure for wood products from natural forests.

LIKELY IMPACTS OF MORE FISCAL INCENTIVES FOR REFORESTATION:

Growth

- Short-term loss of government revenue.
- Increased plantation production, usually by wealthier elements of society.

Welfare

- Can be transferred from government to those reforesting.
- Long-term employment opportunities can increase.

Conservation

- Reforestation provides a number of side benefits in terms of watershed and soil retention traits.

FISCAL INCENTIVES AND POLICIES

Fiscal incentives include exemptions from various taxes, income tax deductions, property tax deductions, and special fee reductions. The effectiveness of any incentive will depend on how well the tax is collected in the first place and who actually pays that tax.

Tax incentives often accrue to the wealthy, and lands reforested are not always those that are the most suitable for reforestation. Beneficiaries are often larger corporations.

Import duty exemptions on reforestation equipment must be carefully monitored for abuses since equipment has multiple uses and such subsidies also often accrue to wealthy. Such replanting subsidies often subsidize the conversion of natural forests to inferior mono-species plantations with the associated loss of both the value of tropical hardwoods and biological diversity.

Deposit fees for reforestation or damages are collected in order to guarantee that reforestation will actually occur. The deposit must be high enough to produce the desired behavior. The deposit is refunded on evidence of an adequate replanting program. If the deposit is not returned, it then becomes another tax. Deposits should be placed in secure escrow accounts to ensure their proper use. In some countries, the deposit is collected from concessionaires on public lands but is not completely applied to reforestation if not refunded.

In order to affect behavior, fiscal incentives must be realistically related to the actual cost of reforestation. If the incentives are lower than actual costs, behavior will not change; if the fiscal incentives are greater than actual costs, inappropriate reforestation may occur. The long-term effectiveness of reforestation activities, however, will depend on the attitudes of the local resource users or owners. Success can be judged by the survival ratio of reforested areas given a sustainable resource management system.

Re-establishment of a natural resource system is more expensive than preservation. There can be significant short-term costs associated with reforestation incentives. The benefits often accrue to the wealthy, who can manage such resources for long-term benefits if the macroeconomic environment or tenure situation supports such behavior. If underlying factors do not support long-term management, reforestation efforts will fail.

PUBLIC REFORESTATION PROJECTS

Large public reforestation policies are often donor supported. They are also often inefficient. Large, government-administered projects often fail to account for agroforestry options or nontimber products from forests. Generally speaking, government ownership of the forest lands has been extended to direct government involvement in activities for that the government has no special capacity.

There seem to be diseconomies of scale and institutional weaknesses with government activities that have not been recognized and administratively addressed. Smaller individual and community-focused activities have generally been more successful because they have addressed the short-term needs of individuals and communities.

The measure of success of reforestation efforts is the number of trees that survive within a long-term resource management system. If incentives are not established for sustained management of the resource, reforestation efforts will not succeed.

Government reforestation efforts represent a drain of public resources that often results in neither significant short-term or long-term benefits to the environment. Successful projects have usually been structured to meet resource user needs. Plantations have been more successful but have also often involved large private-sector participation.

Research Questions

Does the tax system absorb the economic rent for the public sector or does the existence and availability of such rents provide resource users incentives to mine the resource regardless of the length of the concession?

What incentives would encourage industry to acquire ownership of forests?

What are the elements of a successful forest management system?

How would the establishment of a different concession award system interact with other public forest revenue-generating systems and the total amount of economic rent captured by the public and private sectors?

How does the present forest revenue system affect resource use decisions?

Does an adequate information base exist to establish a finely differentiated tax system? Since this is generally not the case, what administratively easier revenue systems are useful for a specific country?

There are trade-offs between economic efficiency and administrative costs and ease. Does the current system address these trade-offs?

Inefficient wood-processing industries have been documented in many if not most situations where protection levels are high. What is the level of protection for these industries?

What complementary policies will be needed to limit resource mining if protection levels are reduced?

Does the macroeconomic environment preclude long-term investment behavior by timber firms?

Where parastatals still exist in timber production, marketing and processing, what are the employment and resource use trade-offs?

Do other policies need to be changed in order to encourage private enterprise? What policies must be enacted to enforce resource management controls that encourage long-term management?

What is the overall structure of the timber and wood products industry? What is the direct and indirect role of the government in this structure?

What is the effect of a particular domestic price control on supply and use of various wood species?

Do fiscal incentives, if they exist, subsidize short-term behavior without considering long-term prospects for resource management?

Will ex ante deposits work more effectively than ex post penalties in affecting compliance with management plans associated with natural or induced reforestation projects?

What has been the long-term success of public reforestation projects? How have these projects been financed? What is the level of donor involvement? What has been the cost?

Have projects been designed to address resource user and community issues? What have been the problems and the reforestation survival ratio?

Have plantations been a focus of either public or private reforestation projects? Have these plantations been focused on the domestic market, the international market, or both?

What has been the industrial structure of these activities and the role of government in encouraging plantations?

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AGRICULTURAL AND LIVESTOCK POLICIES

Product Price Controls

KEY POINTS

- Price policies that have depressed agricultural product prices have also reduced investment in conservation and decreased rural employment and income.
- The linkage from producer prices to agricultural production to natural resource effects is not well understood for either macroeconomic or sectoral policies.
- Production increases resulting from increased prices may come from more intensive agricultural systems, expansion of the agricultural frontier, changes between crops or all of these. There are diverse environmental and welfare effects for all of these.
- Increases in agricultural prices to farmers must be accompanied by a complementary set of policies that addresses tenure, education, technology and credit in order to successfully deal with environmental issues.

LIKELY IMPACTS OF AGRICULTURAL PRICE SUPPORTS:

Growth

- Increased output of targeted crops.
- Overall impact is unknown; depends on how the mix of crops produced within the agriculture sector changes in response to relative price changes.

Welfare

- Food prices for consumers may increase in the short run.
- Employment in the agricultural sector may increase, depending on crop choice.

Conservation

- Potential increased use of pesticides depending on the resulting mix of crops in the agricultural sector.
- Increased use of marginal lands if tenure is problematic.
- Overall impact on the environment depends substantially on interaction with other policies.

Governments often intervene in agricultural markets to change levels of agricultural commodity prices, relative to one another and to prices of nonagricultural goods. Policy tools can be direct, through taxes, price controls or supports, and supply restrictions; or indirect, through exchange-rate policies or the level of protection afforded manufacturing industries (Repetto 1988, 5).

In general, depressing farm profitability reduces the derived demand for farmland, farm labor, and other inputs not supported by government subsidies. Agricultural prices tend to be lower than they otherwise would be, since farmland is a factor of production that cannot shift massively into other uses. Consequently, returns on investments in farmland development or conservation are also depressed. Farmers are discouraged from leveling, terracing, draining, irrigating, or otherwise improving their land. The loss of land productivity through erosion, salinization, or nutrient

depletion is less costly relative to other values in the economy (Repetto 1988, 5).

At the same time, depressed farm profitability reduces the incentive to open up marginally productive land to agriculture. Depressed profitability also reduces the incentive to use costly inputs, such as imported agrochemicals. Hence, to a certain extent, reduced farm profitability can also lead to de facto conservation.

There is a current trend through sectoral adjustment policies to abolish price controls in order to raise agricultural prices. The argument has been that raising producer prices to a level close to world prices will increase the incomes of farmers, enabling them both to secure surpluses that can be reinvested in resource conservation and to expand supply.

"But reality is likely to be far more complex and the current state of research is simply not adequate to pronounce on the nature of the linkage from producer price to agricultural supply response to natural resource effects. Some authorities argue that price increases encourage switches between crops, but have no effect on aggregate output. Others suggest that the aggregate response is also positive" (Pearce and Turner 1990, 354).

The natural resource and environmental dimension adds further complexity to the analysis. Positive supply response may be through an extension of agricultural margins rather than an intensification through application of technology, fertilizers, etc. This will be more obviously the case where there is limited access to technology or limited capacity to adopt it. But extended margins may involve clearance of hitherto forested land or movements into previously marginal arid areas. In both cases there are environmental costs in terms of increased desertification risks, which affect medium- to long-run agricultural yields.

Even with intensive responses, there is the question as to the type of crop that is encouraged. The presumption is that bush and tree crops provide extensive root structures and canopy cover and are therefore less erosive than many root crops such as cassava, maize, millet and sorghum (Pearce and Turner 1990, 355). Issues of traditional versus non-traditional crops and the various issues associated with relative soil loss and relative use of pesticides as well as incentives to convert marginal lands will need to be analyzed within the context of the specific country or region.

Product and input price levels affect profitability and the amounts invested among competing agricultural enterprises as well as between agriculture and other sectors. Governments try to change prices because this approach is easier than directly addressing income issues. Price distortions against agriculture are still quite common despite recent policy changes. In addition, it will take some time for price effects to influence production and resource use decisions and outcomes.

When agricultural policies are artificially low, slower growth or net disinvestment and increased migration of resources out of agriculture occurs. Import-substitution policies for industrial goods effectively tax agriculture since they raise the prices of industrial goods compared to agricultural goods as well as the price of protected farm inputs.

Price policy is often complex and price distortions are often crop specific in that some countries tax some producers and subsidize others. For example, producers of export crops have in the past been heavily taxed, and these taxes have been important and easily collected sources of revenue for governments. On the other hand, producers of food crops have been subsidized by government-administered prices that were higher than they would have otherwise been.

Objectives for agricultural pricing policies are: (1) stabilizing or reducing consumer food prices; (2) maintaining uninterrupted food supplies; (3) stabilizing or maintaining producer prices to guarantee incentives for production; (4) reaching food self-sufficiency (reducing imports); (5) providing government revenue through taxation; (6) increasing foreign-exchange earnings; and (7) promoting industrialization (Stevens and Jabara 1988, 392).

Government short-run policies to benefit consumers may in the long run reduce agricultural production and thereby reduce food supplies and raise consumer prices.

Government-determined prices can be fixed either above or below the free-market price. Regardless, stable and certain prices, in general, decrease the risk of using purchased inputs. Hence, farmers may be more inclined to use purchased inputs under a system of government-administered prices.

PRICE CEILINGS

Ceiling prices are the highest prices that can be legally charged by producers or to consumers. The level of the marketing chain at which the ceiling price is enforced, producer or consumer, is an important determinate of the potential impact on natural resource use. For ceiling producer prices, other restrictions are often needed in order to force producers to sell to the government. Indeed, it is difficult to enforce a ceiling producer price set below the market price as black-market activities will inevitably arise or shortages will result. Nonetheless, if the ceiling prices at the producer level are effectively administered, the returns to agricultural activities will be reduced and less investment in long-term resource management will be undertaken.

Ceiling prices that are enforced at the consumer level may or may not have the same impact depending on whether the ceiling consumer price is effectively transmitted back to the farmer. Governments in developing countries will often attempt to support producer prices and restrict consumer prices simultaneously. To achieve this objective, parastatal marketing agencies are expected to perform the necessary marketing functions at unrealistically low margins. Consequently, marketing parastatals, which tend anyway to be less efficient than private sector alternatives, frequently generate huge fiscal deficits.

PRICE FLOORS AND SUPPORT PRICES

Floor or support prices provide a guaranteed minimum price to producers. Support prices set below the market equilibrium price generally involve limited purchases by the government. "The government serves as the buyer of last resort should the market prices drop to the floor level. For example, due to a lack of storage capacity or farmers' financial constraints that require selling of all of a crop at the start of a season, farm prices are often depressed at harvest. Floor prices reduce the risk of even lower prices during this period and encourage agricultural investment" (Stevens and Jabara 1988, 394).

In addition, as mentioned above, prices at or above the market price may be difficult to administer because of the financial drain on the treasury. The government often does not have the institutional capacity to administer these prices.

It is also important to note that large farmers tend to benefit more from support prices since they tend to be located closer to government buying stations than small farmers. Small farmers also often do not have access to transportation or produce in small quantities that do not make transportation to buying stations worthwhile. In addition, selling to government buying agencies is occasionally restricted to registered sellers, who more often than not are large farmers.

PRICE BANDS

There are a number of variations of the ceiling and support price system. A price band, for example, sets both a maximum and a minimum price structure. Buffer stock programs for food security might also be a part of the program.

If these programs are effectively administered, they influence not only the distribution of wealth between producers and consumers but also resource allocation in the economy. The effects could be positive from a natural resource perspective if uncertainty is reduced and prices increase on average. If, however, prices are reduced, short-term resource exploitation may be increased. The welfare effects of increasing prices to consumers can be addressed by direct transfers such as food stamps. Such a program is being tested in Honduras. Ignoring the effects of structural and sectoral adjustment policies on the urban poor has resulted in the demise of more than one government and is a significant potential block to increasing agricultural production in many countries.

Input Subsidies and Prices

KEY POINTS

- **Subsidies for agricultural inputs can result in the adoption of technology in the short run. But if left in place too long, subsidies can result in inefficient use and skewed production decisions in the long run.**
- **Credit subsidies often favor large borrowers and commercial enterprises to the detriment of smaller producers. This can result in pressure on the agricultural frontier.**
- **Credit policies often favor capital-intensive versus labor-intensive activities. This is biased against adoption of conservation practices such as integrated pest management.**
- **Pesticide subsidies result in overapplication, often by large, commercial operations.**
- **While fertilizer subsidies can trigger increased production, they also bias decisions against organic solutions to soil fertility problems.**
- **Machinery subsidies also favor large, commercial producers and bias decisions in favor of capital instead of labor, thereby contributing to rural employment problems.**

Input subsidies are used to lower the cost of modern inputs in agricultural production. This policy is designed to address issues of lack of knowledge about improved technologies, financial constraints, risk aversion, or other economic policies that artificially raise the price of these inputs. The long-run problem of such subsidies is that they remain after the new technology has been adopted and thus encourage overuse of these inputs (Stevens and Jabara 1988, 401).

In addition, the production decisions made by resource users as a result of such subsidies can have significant natural resource and environmental consequences. Credit, pesticide, fertilizer and machinery subsidies can have dramatic effects on what is produced, the external effects of that production process and the use of other lands and resources.

LIKELY IMPACTS OF REDUCING OR ELIMINATING INPUT SUBSIDIES:

Growth

- Long-term increases in agricultural production from improved sector efficiency.
- Short-term reduction in the use of inputs and therefore lower production.
- Overall impact on long-term output depends on the change in the mix of crops produced.

Welfare

- Long-term increase in employment in the agricultural sector.
- Shift in the distribution of income away from large producers.

Conservation

- More appropriate application of chemical inputs.
- Less pressure on marginal lands.

CREDIT SUBSIDIES

Credit for agricultural and livestock activities is subsidized by a number of methods. These include: (1) purchasing specific inputs, such as pesticides and chemical fertilizers; (2) growing specific crops, such as cotton or coffee; (3) acquiring specific assets, such as cattle or tractors; or (4) developing land, by clearing forests, constructing conservation works, building on-farm irrigation structures, etc. (Repetto 1988, 27).

Interest-rate ceilings are imposed by regulation and loans are often subsidized, usually by allowing the lending agencies to discount their loans with the monetary authorities at favorable rates. Such policies undermine the operations of private credit institutions and potentially limit access to credit by other parts of the agricultural sector and other sectors. The lack of availability of credit can impede the adoption of conservation technology and lead to the inefficient use of inputs.

In inflationary economies, real rates of interest can be well below zero. Default rates are also often very high, since the lending institutions are largely absolved from risk. Defaults are also often with the larger borrowers.

Highly advantageous interest rates imply the need for quantitative lending limits and credit rationing. Since lending institutions can minimize transaction costs with larger borrowers, the wealthier elements of society often capture such programs. "The distribution of subsidized rural credit is typically even more skewed than the distribution of land in developing countries" (Repetto 1988, 27).

The allocation and efficiency effects of credit subsidies are less clear-cut. The uncertainty stems from credit's fungibility and the resulting difficulty lenders have in ensuring that, on the margin, directed credit will actually increase the flow of resources to the activities they intend to subsidize. The longer credit subsidies are maintained, the more likely it is that the subsidies will come to resemble general capital transfers, with little effect on the intended resource use. This is true since borrowers have a wide range of options in the long run for reshuffling their own cash resources and funds borrowed from various sources (Repetto 1988, 28).

However, to the extent that credit and machinery subsidies do effectively promote capital-intensive forms of agriculture with significant economies of scale, such as ranching, they displace farm labor. Since rural populations are still growing and employment problems are acute, labor displacement puts marginal lands under even greater pressure. In addition, because the structure of credit requirements generally favors capital-intensive technology, labor-intensive approaches such as integrated pest management, will be ignored.

PESTICIDE SUBSIDIES

Pesticide subsidies are provided through tax and tariff concessions, low-interest farm credits, incentives for local manufacturers, and direct-marketing subsidies. Exchange-rate policies may also favor importation of pesticides.

By lowering pesticide costs to farmers, these policies artificially depress the economic threshold for pesticide use and encourage excessive application. Subsidies also artificially lower the costs of chemical use relative to other control methods: integrated pest management practices such as

planting resistant varieties, finding and destroying infected plants, altering planting dates, etc. Because many of these alternative practices involve more labor time, subsidizing chemicals tends to diminish rural employment opportunities.

According to Repetto (1988, 18), "Virtually no research or analysis has been undertaken to find out how price subsidies affect farmers' decisions regarding pesticide use, what kind of farmers receive most of the benefits from subsidy policies, or even the extent to which subsidies are actually passed through the distribution chain and reach the farmers they are supposed to benefit." The distribution of pesticide subsidies often conforms to the distribution of landholding, which in most countries is highly skewed. "Yet most occupational poisonings affect hired farm workers, who are usually landless or very small farmers." (Repetto 1988, 18). In most countries pesticides are primarily used on commercial crops.

The scarce resources in Central America make it impossible to effectively regulate pesticides, monitor the ecological and health effects of pesticide use, study integrated pest management strategies, or extend safe and effective methods of pesticide use to farmers.

FERTILIZER SUBSIDIES

The primary reason for fertilizer subsidies was to overcome farmers' uncertainties and perceptions of risk in adopting new packages of inputs that entailed considerably larger cash expenditures but promised higher returns.

In recent decades fertilizers have contributed more to higher yields than to extending areas under cultivation. But there are trade-offs among increased production from fertilizers, reduced pressure for expansion of cultivated land and the long-term effects of fertilizer subsidies on soil productivity. A central concern is that the subsidies artificially lower the cost of maintaining and restoring soil fertility and induce substitution in favor of chemical fertilizers and against organic fertilizers. Fertilizers, like pesticides, also contribute to agricultural run-off and non-point sources of pollution.

Subsidies can be direct or indirect. Indirect subsidies include favored exchange rate, tariff, and foreign exchange allocations for imported fertilizers; preferential pricing of

energy, feedstocks, and transport services for domestic production; and subsidized credit for fertilizer purchases.

Fertilizer subsidies have a number of important effects: (1) distortion of the choice of crops; (2) large direct and indirect fiscal costs; (3) distributional issues associated with wealthy beneficiaries; (4) low application efficiencies; (5) less diversified and more chemical dependent cropping patterns; and (6) rural employment effects.

SUBSIDIES FOR AGRICULTURAL MACHINERY

Agricultural machinery and equipment almost invariably receive favorable tariff and exchange-rate treatment and are afforded high priority when rationed foreign exchange is allocated. In addition, credit policies also favor mechanization.

Agricultural-mechanization subsidies can result in inefficient patterns of agricultural production by inducing farmers to use equipment even when it is uneconomical to do so. Generally, this practice results in severe problems of labor displacement, reducing rural employment opportunities and exacerbating rural poverty. Equipment subsidies have not only promoted forest clearance by lowering the financial costs of land preparation; they have also drastically changed the technology of the operation (Repetto 1988, 26). The subsidies almost always favor large producers and affect the relative profitability of large versus small producers.

The effects of mechanization need to be analyzed within the context of trade-offs between rural employment and production contributing to national economic growth. The environmental consequences also must be considered. There is little reason to continue such subsidies if the equipment subsidized would be used regardless of the subsidy or if the aggregate set of subsidies greatly distorts production decisions, especially where the environmental consequences of mechanization are ignored.

Direct Government Activities

KEY POINTS

- **It is difficult to generalize about the effects of direct government involvement in agricultural activities on the use and sustainability of natural resources. The range of potential impacts is quite diverse.**
- **If government agencies are effective in providing farmers with greater access to inputs, particularly at subsidized prices, intensive input-dependent methods of cultivation are tacitly promoted in relation to alternative, more traditional and perhaps lower-impact cultivation practices.**
- **Parastatals that attempt to control quality through minimum buying standards or price penalties for lower quality will tend to promote greater use of hybrid seed varieties and agrochemicals.**
- **Parastatals that control quantities though imposition of production quotas may indirectly inhibit matching of land use with land capability.**

It is difficult to generalize about the effects of direct government involvement in agricultural activities on the use and sustainability of natural resources. The range of potential impacts is quite diverse. Moreover, the potential impacts vary greatly with existing conditions and because of interactions with other policies.

LIKELY IMPACTS OF REDUCING OR ELIMINATING GOVERNMENT PARTICIPATION IN AGRICULTURAL MARKETING:

Growth

- More efficient marketing system will increase long-term economic growth.
- Less pressure on government budget.

Welfare

- More private-sector employment and less government employment.
- More efficient food system.
- Reduction of support to large farmers.

Conservation

- Improved rural employment and more efficient food system can result in less pressure on marginal lands.

INPUT MARKETING

Direct government involvement in the distribution of agricultural and livestock inputs is a common means for governments to encourage increased production and provide subsidies to target groups. If government involvement is effective in providing farmers with greater access to inputs, particularly at subsidized prices, intensive input-dependent methods of cultivation are tacitly promoted in relation to alternative, more traditional and perhaps lower-impact practices. Two of the more direct potential negative impacts are overuse of agrochemicals and resulting soil or water contamination.

The distribution of agrochemicals also affects efficiency of resource use by tacitly encouraging more intensive cultivation methods. Depending on land availability, the results could be quite diverse. If land is scarce, the result may be positive: decreased pressure on nonagricultural lands. If land is not scarce, the result may be negative: lack of exploitation of idle, but suitable, lands.

The range of inputs that are distributed and type of groups that are targeted by the government also shape land use by influencing crop choice and more fundamentally the choice between agriculture and livestock. The distribution of medicine for livestock, for example, clearly promotes the use of land for pasture over other potential uses such as agriculture or conservation, regardless of the land capability. Similarly, the distribution of agrochemicals that are particularly suited for fruits and vegetables will promote cultivation of nontraditional export crops over production of basic grains.

In addition to efficiency of land use, the choice of inputs to be distributed can have a direct impact on the sustainability of natural resources. For instance, the impact of distributing chemical fertilizers instead of organic fertilizers is clear cut. Likewise, the choice of which pesticides to distribute can have a long-lasting effect on soil and water. It is worth noting that direct government involvement also provides a means for educating producers and ranchers on the appropriate use and application of inputs. The lack of governmental resources, however, commonly makes education a low priority.

PRODUCT MARKETING

Direct government involvement in the marketing of agricultural products distorts natural-resource use by providing incentives or disincentives to increase production or by directly controlling the quantity or quality of agricultural output.

The distortion is actually derived from the objectives underlying or prompting the government involvement. Parastatals that are directly involved in marketing in order to support minimum producer prices, if effective, will promote expanded production of the particular crop. In contrast, parastatals that are used primarily as a means of collecting taxes will have the opposite effect on production. In either case, the farmers' response to the incentive or disincentive will determine the impact on natural resource use. For instance, farmers may respond to incentives by adopting more intensive cultivation techniques or by expanding land under production. Farmers may respond to disincentives by reducing the use of intensive inputs and investments in conservation or by shifting to other crops altogether.

Parastatals that attempt to control quality through minimum buying standards or price penalties for lower quality will tend to promote greater use of hybrid seed varieties and agrochemicals. The main potential threat to natural resources is clearly overuse of agrochemicals and the resulting soil or water contamination. Positive potential outcomes include greater care of orchards and other perennial crops, and better matching of land use with land capability.

Parastatals that control quantity though production quotas may indirectly inhibit matching of land use with land capability. Quotas imply limited entry of new participants into the sector. Consequently, land owned by individuals outside the sector may be excluded regardless of its suitability. Similarly, quotas imply that producers receive a higher price than they would without the quotas. Hence, there is a disincentive for producers with quotas to shift land under production to other uses. The potential overall result is inefficient use of resources, particularly land.

Regulation of Pesticides

KEY POINTS

- Policies regulating the importation and use of pesticides are generally not enforced because of inadequate institutional resources.
- Poor policy enforcement has allowed contamination of soil and water, worker poisoning and consumer endangerment.
- Pesticides are often applied in excess of recommended levels and without proper safety precautions because of user ignorance or carelessness.
- Import tariff regimes tend to favor importation of pesticides in relation to other products and to promote chemical control in place of more labor-intensive methods.
- Policies in industrialized countries that regulate pesticide residues of imported products are more effectively enforced than domestic pesticide residue policies.
- Increased production of nontraditional crops and expansion of agriculture, in general, to more marginally productive land tend to promote greater use of pesticides.
- By increasing agricultural productivity, pesticides can reduce pressures to expand agriculture into forested areas.

LIKELY IMPACTS OF BETTER IMPLEMENTATION OF PESTICIDE REGULATIONS:

Growth

- Increased cost of production will reduce agricultural production and exports in the short run.
- More efficient production will increase economic output in the long run
- Greater certainty of pesticide safety may increase agricultural exports in the long run.

Welfare

- Reduced exposure to toxic chemicals for rural population.
- Increased employment from integrated pest management-type programs.

Conservation

- Reduced toxicity of soil and water.

DIRECT REGULATION

The most common approach to pesticide regulation is to restrict the types of pesticides that may be used in a country. The efficacy of pesticide restrictions, however, is entirely dependent on two key factors: the degree of rigor in selecting which pesticides are not acceptable; and the ability of government institutions to effectively enforce the restrictions.

The selection of acceptable pesticides is usually left up to an implementing agency, often the Ministry of Agriculture, through broad laws that generally do little more than delegate authority. Specific criteria for assessing pesticides can range substantially in terms of rigor and complexity. In practice, the rigor is generally less than that for industrialized countries: pesticides that are banned or severely restricted in industrialized countries are occasionally considered acceptable in developing countries.

In general, criteria can range from clear-cut threshold levels of specific toxic compounds to more amorphous economic cost-benefit comparisons. Complexity of criteria must be balanced against the responsible institution's ability to undertake the required chemical and/or economic analyses. In practice, countries without adequate institutional capability adopt threshold levels developed by industrialized countries and require pesticide producers and importers to submit chemical analyses from independent laboratories before the pesticide can be registered as acceptable.

Enforcement of pesticide prohibitions is costly. Many pesticide problems result from lax policy enforcement because of limited institutional resources. Illegal importation is particularly difficult to monitor and a major source of ineffective pesticide regulation. Unregistered as well as prohibited pesticides commonly find their way into countries either through nonpatrolled borders or with help from border officials. Government agencies may confiscate nonapproved pesticides when discovered, but the probability of detection is low.

Pesticide distributors are often required to register with a monitoring agency and in some countries are subject to random inspection to ensure that all pesticides for sale are properly registered and that safe storage and handling procedures are followed. In practice, however, monitoring institutions have not had the resources to conduct such inspections.

Soil and water contamination as well as worker poisoning and consumer endangerment are thought to more often result from improper application of approved pesticides than from the use of banned pesticides. Technically, many governments have regulations that delegate authority to an institution for ensuring that application procedures are in compliance with manufacturers' specifications for human and livestock safety.

Policies that are used to ensure proper application include labeling requirements, mandated educational programs and sanctions for improper use. Implementation, however, tends to be inadequate. Small farmers, and hired hands on large farms, frequently cannot read labels and have little idea of the dangers and the negative environmental effects that may result from improper application. Distributors are not likely to be of much help in providing information, and extension services typically don't have the resources to un-

dertake adequate educational programs. Also, government agencies have neither the manpower nor the financial resources to monitor pesticide application and often do not have the mechanisms or capability for monitoring the environmental effects, such as water quality. Very rarely are sanctions applied.

Indirect Regulation

The majority of pesticides used in developing countries are imported. Hence, import tariffs and other import regulations can have a significant, albeit indirect, impact on pesticide use. Tariff regimes often favor agricultural inputs in relation to other imports and effectively encourage more pesticide use than would occur under a neutral tariff regime. Similarly, tariff regimes that favor the export of crops that rely heavily on pesticides effectively encourage greater pesticide use. One tax regime in Central America even went so far as to reduce an already low import tariff on pesticides for those that are being applied to nontraditional export crops.

Cross-border Effects

Domestic pesticide use is affected by policies in neighboring countries. Pesticides often find their way into countries despite restrictions and outright bans. Consequently, more lax pesticide policies in neighboring countries have the effect of undermining domestic policy. Similarly, price differences between countries due to variations in subsidies or import tariff structures have an impact across borders. Pesticide usage will inevitably increase as a result of subsidies in neighboring countries. However, regulations in industrialized countries that limit pesticide residues in imported foods can effectively reduce and even eliminate pesticide use in agricultural exports from developing countries.

Livestock Policies

KEY POINTS

- **Livestock producers have received many benefits from public policies that have provided subsidized credit, fiscal incentives and tax breaks, advantageous land-tenure laws and subsidized government services.**
- **These combined policies have provided cattle operators significant advantages when compared to other land uses. This has resulted directly in the destruction of large areas of forests in Central America.**
- **Cattle operations have been found to be unprofitable in the absence of such policies in analyses of other countries.**

Many policies discussed in other sections, for example, on agricultural and livestock policies, macroeconomic policies, and land tenure, are directed at livestock production and producers. Some of these policies may provide disincentives to livestock production. However, the historical trend has been to promote and subsidize livestock production, which has resulted in a rapid expansion of pastures in Central America. This expansion has occurred almost exclusively at the expense of tropical forests, both directly and indirectly through expansion of the agricultural frontier by those unable to find jobs in an agricultural system that provides few jobs such as cattle production.

Livestock production has some advantages over competitive land-use activities, especially forestry, because it has a shorter time frame for the return on investment. In addition, in rural areas cattle are easier to transport than timber. But other advantages have been given to cattle producers. The primary policies favoring cattle include subsidized credit, fiscal incentives, tenure policies, and provision of infrastructure for the livestock industry.

LIKELY IMPACTS LESS FAVORABLE POLICY BIAS FOR CATTLE PRODUCTION:

Growth

- Shift of land from inefficient cattle operations to more efficient cattle and agricultural activities will increase output in the long run.
- Reduced cost of government-supported projects.

Welfare

- Greater employment in the agricultural sector.
- Shift in income distribution away from rural wealthy.

Conservation

- Less pressure on forest resources.
- More appropriate land use.

CREDIT POLICIES

Livestock production has received many forms of credit preferences. There is a natural advantage for cattle as collateral when land tenure or security are issues. In addition, credit programs have earmarked long-term loans at low or negative real interest rates for the livestock sector. Livestock often gets a disproportionately large amount of the credit available to the agricultural sector from both public and private sources of credit.

Large livestock operators generally are members of the wealthier classes, which also control both private banks and public decisions related to nonprice allocation of credit. From the point of view of delinquencies, large cattle operations represent a large share of the debt, and the fungible loans are often used for consumption rather than for production purposes. Programs to reschedule debt similar to those discussed recently in Costa Rica favor continued support for the livestock sector.

Fiscal Incentives

Fiscal incentives provided to livestock operations have included accelerated depreciation, tax holidays, provisions for offsetting taxable income from other enterprises, and beneficial relative export duties as compared to products from competitive land uses such as forestry and agricultural export crops.

Other tax incentives are more subtle. Property and land taxes, if effectively enforced at all, are low and do not put pressure on agriculturalists to use land for the more intensive uses for which it is often suited.

Tenure Policies

Tenure and land-reform policies also provide incentives for livestock production. Land-reform laws may stipulate a certain intensity of livestock land use to define idle lands, which makes expropriation of such land more difficult than for crop lands or forest lands. Colonization and new settlement requirements stipulate than land must be cleared to be considered occupied. Frequently, the only use for such land once cleared is for extensive cattle operations.

Provision of Public Services

Governments often provide infrastructure and livestock services to support livestock operations. In addition, livestock are grazed on public lands with little or no fees applied. The governments seldom recover directly the cost of such services even if livestock fees or head taxes do exist. The charges do not account for the natural resource and environmental degradation associated with livestock.

Research Questions

To ensure that increased agricultural product prices do not adversely affect natural resource productivity and sustainability, what other policy areas need to be considered?

How does the removal of agricultural price controls affect the mix of crops produced in the agriculture sector? How does the change in product mix affect natural resource productivity and sustainability?

What changes in the mix of crops produced will occur as a result of the elimination of input subsidies?

How can credit policies be restructured to promote labor intensive alternatives to chemical inputs (e.g., integrated pest management programs)?

Will the banking system continue to favor large producers even if government subsidies for inputs are removed?

What program or policy alternatives are available to promote safe and correct application of intensive cultivation methods?

Does an extension system exist that can educate and enable farms to apply appropriate levels of inputs?

What kind of regional cooperation is necessary to deal with the cross-border consequences of pesticide policies?

What is the most cost-effective approach to ensure proper and safe pesticide use (e.g., product regulation, use regulation, education)?

What alternative collateral regimes would reduce the existing cattle bias in the banking system?

Which land reform or tax mechanisms are effective in redistributing land used for low-productivity cattle ranches to higher-productivity uses?

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LAND TENURE AND COLONIZATION

Land Tenure and Markets

KEY POINTS

- Many state-owned resource areas, such as forests and wildlands, are subject to unchecked exploitation because governments lack the ability to fully enforce control over resources.
- The lack of security and uncertainty of land ownership for large and small farmers alike promotes accelerated exploitation of resources.
- The lack of security of land ownership is caused by unclear legal titles to the land, ineffective systems for settling title disputes and perhaps, most importantly, lack of ability to enforce rights of ownership.
- Several examples of successful models of common land ownership and resources management exist in Central America. Isolated indigenous forest populations can be successful in sustainable resource management. However, common property models are very susceptible to population pressure from inside or outside the group.
- Skewed land distribution has contributed to inefficient uses of natural resources: the large tracts of land with high agricultural potential are underutilized and used primarily for cattle ranching while smaller, less productive parcels of land are used for intensive agriculture.
- Skewed land distribution has also contributed to accelerated environmental degradation by forcing small untenured farmers to settle on more fragile lands that are inappropriate for the intensive cultivation techniques these farmers employ.

LIKELY IMPACTS OF IMPROVED LAND MARKETS:

Growth

- More efficient land utilization and greater agricultural production as land moves into more appropriate uses.
- Should result in more agricultural production, greater exports and increased GNP.

Welfare

- More employment in rural areas and less population movement into urban areas.
- Increased employment in rural areas will result in lower rates of population growth when combined with family planning and fertility-regulation services.
- Food production should increase.

Conservation

- Less pressure on natural resources because of greater rural employment.
- More intensive agriculture and greater use of pesticides and fertilizer.

PROPERTY RIGHTS

Four basic categories of land tenure are commonly recognized: open-access, state-owned, private property and common property. The categories are differentiated primarily by the property rights and duties associated with the land.

Open-access resources are not controlled by an individual, a group or the state, and individual access and use are not regulated. At an extreme, resources on open-access property are subject to the rule of capture: the first individual to take control of the resource receives the benefits. This characteristic results in an "every person for himself" mentality; individuals do not consider the impact on others or on the resource in the long term. Consequently, there is a great incentive to deplete resources rapidly. Open-access land, which is often referred to as the frontier, technically

no longer exists in Central America. Land has long since been designated as either private, state or common property.

State property is land that is technically owned and controlled by the state. The government has the right to deny or regulate individual access to or use of the property and the attached resources. Typically, national forests, parks, military reservations and coastal zones are state-owned lands. Governments often assume the role of managing the resources on these lands under the premise that open access would lead to rapid depletion of valuable national resources, such as grazing forage, fuelwood, timber or fodder. Governments may also use such lands as a source of tax revenues.

In practice, however, governments often do not choose or do not have the capability to fully enforce control over the property or over natural resources such as forests or water that are on the property. For example, the inability to prevent individuals from taking fuelwood from state property is a common problem throughout Central America. As a result, state property often takes on the characteristics of open-access lands, and individuals effectively have free access to use the land and its resources as they please.

Private property is owned and controlled by an individual. A primary right of the private property owner is to exclude other individuals from using the property. Actual use, however, may be shaped by state regulations and perhaps most importantly by the owner's ability to enforce his rights. Indeed, the owner's ability to enforce the rights of exclusion and control over use of property is just as important as legal standing. An ineffective legal system or inadequate financial resources to enforce rights make the rights of exclusion and control moot. In the absence of ways to enforce rights, private property, like state property, effectively takes on the characteristics of open-access land.

In general, secure rights of ownership and the ability to enforce them provide the owner with an incentive to protect land and carefully manage its natural resources to ensure that value and usefulness are maximized over the long term. Conversely, insecure tenants generally attempt to maximize benefits in the short run and often fail to consider negative long-term effects. Insecure ownership can promote deforestation, destructive mining of natural resources and employment of cultivation and fishing practices that rapidly or irreparably deplete soil and water quality.

However, no particular ownership structure, including private ownership guarantees long-term resource management. When overall economic conditions favor trade versus investment and production, resource management will not be a high priority. Poor people will have no incentive to manage and conserve resources if their more immediate survival goals are unmet.

Common property is owned and controlled jointly by a group of individuals. Indigenous land owned in common by a community or tribe is a typical example in Central America. Common property differs from open-access land in two significant ways. First, as with private property, a primary right of the owners of common land is exclusion of non-owners. Second, individual owners of common property do not have complete autonomy over use of resources; individual owners are governed by norms or rules that are jointly enforced by the group members. Hence, effective management of resources on common land depends on the group's ability to exclude non-owners and to effectively manage its members. Throughout Central America, there are numerous examples of indigenous forest communities that are very successful models of sustainable resource management on common property.

Common-property models, however, are susceptible to population pressures from both inside and outside the group. Increased size of the group itself can strain the sustainability of traditional management practices and make enforcement of group rules or norms more difficult. Population pressures from outside the group can stretch the group's ability to exclude others. Access to markets also can strain resources in common-property systems.

OWNERSHIP DISTRIBUTION

Management and conservation of natural resources are shaped by the distribution of land ownership in several ways. In countries where distribution of land is uneven, large farmers tend to have control over the most productive agricultural land. Consequently, small or landless farmers are left to settle on less productive land that tends to be more susceptible to rapid resource degradation. Small farmers are often forced to settle on forest land or other protected areas.

Uneven distribution of land also tends to be correlated with inappropriate land use. Large land parcels, which are

well suited for agriculture, tend to be underutilized and used largely for cattle ranching. This tendency is the result of a series of policies, which commonly includes subsidies for cattle ranching. In contrast, small farms are often situated on land that is not well suited to the slash-and-burn and intensive farming techniques generally employed by small farmers. A particularly acute problem is erosion of hilly slopes on which small farmers often settle.

The cost of excluding non-owners from large parcels of idle land that are generally associated with unequal distribution can be prohibitive. Owners are sometimes not able to fully prevent non-owners from utilizing resources. Spontaneous settlements or temporary incursions to extract resources, such as fuelwood, are common. Under these conditions, private land takes on the characteristics of open-access land, and neither the trespassers nor the large farmers have incentive to implement effective conservation or reforestation programs.

LAND MARKETS

Land markets provide a means of capturing the value of land. Hence, active land markets and other means to transfer rights to land (e.g., inheritance) provide incentive to legitimate owners to conserve resources because their ability to recoup the short-run cost of conservation is improved. Again, the land owner will tend to try to maximize the long-term benefits from the land. Conversely, without land markets or an ability to transfer ownership rights through inheritance, land owners may choose instead to maximize benefits over their own lifetimes; deforestation and poor conservation of soil results.

Active land markets imply that secure individual property rights exist and are recognized. Thus, in a sense, active land markets reflect a land owner's ability to exclude others and control the resources on that land.

Active land markets also improve the willingness of lenders to accept land as collateral. The land owner's ability to obtain loans in turn raises the value of the land and thus the incentive to conserve resources. However, lending institutions in several countries do not consider the value of standing timber when assessing land.

Taxes on idle lands that are imposed in order to promote redistribution of large underutilized lands have had a negative impact on natural-resource conservation. Forest lands

are often considered idle by government definition. Consequently, to avoid these land taxes, land owners will often clear forested land without regard to the value of the timber or the potential use of the cleared land. As a result of this response and the uneven application of these taxes, idle land taxes have for the most part been ineffective in promoting land redistribution.

Land titles go hand-in-hand with active land markets. Clear titles are proof of secure tenure and are commonly desired by banks as collateral. Land markets and mortgage lending are less active in countries where land titles are unreliable or where the cost of ensuring clear title to land is prohibitive. Settling disputes over titles is typically an expensive, time-consuming process in most Central American countries. One response to the lack of enforceable tenure is the rapid depletion of natural resources, as in the case of open-access lands.

In several countries, informal markets exist for claims to land, albeit incomplete, obtained by squatters. Informal markets for limited rights to land claimed by squatters legitimize the existence of professional squatters and consequently provide incentive to invade de jure or de facto open-access land. This encourages individuals to invade public and private forested lands and clear the land in order to obtain rights that can in turn be sold.

Colonization and Reform

KEY POINTS

- Because they promote deforestation of previously protected forest lands, government-sponsored colonization programs are in direct conflict with objectives to conserve natural resources.
- Because government-sponsored colonization programs generally do not match land use capability with proposed use, they contribute to accelerated degradation of resources.
- The requirement that colonists must clear land of trees to register a claim encourages deforestation.
- Government reform policy that considers forestland as idle encourages large land owners to remove standing timber to safeguard against expropriation.
- The construction of roads through forests and other protected areas to facilitate resource extraction provides squatters with access to isolated areas, particularly forests and indigenous lands.
- Deforestation of public and private lands is indirectly encouraged by policies that grant rights to squatters for improvements they make to land.

LIKELY IMPACTS OF ELIMINATING LAND-CLEARING REQUIREMENTS:

Growth

- Short-term loss of agricultural production but leaving resources for long-term use or preservation.
- Long-term growth in products from managed forests. Long-term increase in market share of managed-forest products as forests in other parts of the world disappear.
- Long-term reduction in the livestock sector unless it moves to feed-lot production.

Welfare

- In areas that are appropriate for intensive agriculture, lower ability of rural areas to absorb population.
- In areas that are not appropriate for agriculture, higher per capita income in the long term with sustained use of forest resources.
- Lower ability of rural areas to absorb population and provide a safety valve in the short term.

Conservation

- Maintenance of resource in what is frequently the most appropriate long-term use.
- Greater possibilities for preservation efforts and associated benefits such as biodiversity.

DIRECT GOVERNMENT POLICIES

Government programs to open up state-owned land generally conflict with objectives to conserve natural resources. Land that is chosen for colonization is more frequently than not forested reserves or other areas that were previously designated as protected areas. Deforestation and loss of biodiversity are the most immediate results.

Just as importantly, land-use capability is not a strong consideration in the colonization process. As a result, colonists are often settled on land that is inappropriate for the

intended use. Hence, degradation of natural resources—apart from deforestation—is accelerated. For instance, cattle ranchers have been granted land in areas with soils that are prone to compacting and thus are poor choices for pasture land. Similarly, small subsistence farmers are often given marginal parcels that are prone to erosion and rapid loss of soil fertility.

Colonists are often given parcels without consideration of the additional resources needed to ensure that the land is managed carefully. As a result, colonized land can quickly become nonproductive and at that point is commonly abandoned.

Colonists are often required to improve the settled land to register a legal claim. More often than not, "improvement" means clearing the land for agricultural use. Deforestation and loss of biodiversity are immediate results.

A common government policy to consider forest land as idle also promotes deforestation by large land owners in an effort to ensure that the land is not expropriated. Under this type of policy, little consideration is given to conservation and even less to reforestation.

INDIRECT GOVERNMENT POLICIES

Construction of roads through forests or other protected reserves to develop mineral or timber operations often indirectly promotes colonization along the roads by the mere fact of providing access to previously isolated areas. This is particularly true of forest land that is owned or settled by indigenous populations. Their land is usually not cleared for agriculture, and fences or other demarcations of possession are not common. To a settler, indigenous land appears to be open-access land.

SPONTANEOUS SETTLEMENTS AND INVASIONS

Spontaneous invasions into public or private lands often have the same immediate effects as government-sponsored colonization: deforestation and loss of biodiversity. Again, consideration is rarely given to the suitability of the land for the land use. Spontaneous invasions are indirectly promoted in at least one Central American country, Costa Rica, through a law that grants the settler the right to be compensated for any "improvement" to the land, regardless of whether the land is public or private. Hence, there is incentive to quickly clear forest land even if subsequent expulsion is anticipated.

Governmental responses to invasions can also encourage future invasions. Faced with an inability to expel or resettle squatters for political reasons or lack of resources, governments often choose to do nothing, which in effect condones future invasions. Some governments have effectively legitimized the invasion programs by subsequently providing assistance to delineate parcels and establishing mechanisms for granting title. One governmental response was to purchase private land that had been invaded and then officially redistribute it to the squatters.

Although clearly a difficult political and operational issue, spontaneous invasions should not be encouraged either openly or indirectly by acquiescence. Uncontrolled settlements can lead to inappropriate land use and resulting resource degradation. Settlements, if deemed necessary, should be planned with careful consideration of land use capability.

Research Questions

What are the security issues associated with different property classes? Do methods exist to provide security for land use within an economically relevant period of time, such as roll-over leases?

How active is the land market? Are there policies that inhibit its functioning, such as prohibitions on leasing and mortgaging?

Does the distribution of wealth suggest that changes in land use and markets will be difficult to implement without significant changes in the socioeconomic system? What marginal changes can be made to encourage more intensive uses of land?

Does the land tax system encourage less extensive uses of good agricultural land? How do land and property taxes contribute to government revenue and what would be the returns to more efficient tax administration?

Can land tenure changes improve land utilization if subsidies for livestock activities continue?

What kind of administrative and support system would help settlers manage forest resources as an alternative to clearing land for short-term agriculture and cattle productions?

Requirements to clear land to show occupancy should be eliminated unless land utilization warrants such actions. What are the consequences for colonization programs and efforts of eliminating of such a requirement?

Governments often support or allow the building of roads, which then opens up land for spontaneous colonization. Environmental consequences either have not been considered or have been ignored for most such projects. Do governments have the political will or institutional capacity to examine these issues in advance without outside support?

Will colonization program reforms be successful in long-term resource management without reduced population growth, more rural and urban employment, or both?

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PROTECTED AND RESERVED AREAS

Management Issues

KEY POINTS

- Although Central America has an extensive protected-area system on paper, there is often no government presence in the field and most areas are being rapidly degraded through human encroachment.
- Population pressure and poverty will continue to be the main threats to protected areas. Policies to establish, manage and protect conservation units must anticipate and take into account demographic trends.
- Effective protection requires changing, limiting or preventing some uses.
- Absent enforcement capabilities, changing behavior requires an integrated package of incentives that alter individual decisions about the gains and losses associated with various uses.
- Successful management policies must benefit both nearby residents and the protected area.
- Incentives, especially those aimed at stimulating production, may have perverse or unanticipated outcomes.
- Fiscal incentives have generally resulted in overexploitation of biological resources rather than their conservation.
- Protected and reserved areas must be supported by appropriate national policies and be included in an integrated package that addresses rural development, education, protected-area management, training, institutional development and legislative reform.

LIKELY IMPACTS OF MAINTAINING AND/OR EXPANDING PROTECTED AREAS:

Growth

- Long-run growth in GDP from increased tourism and its support industries, and multiplier effect from development of infrastructure supporting the tourist industry.
- In the case of protected marine areas, sustained contribution to GNP from the productivity of fisheries.

Welfare

- Long-term growth in local employment from tourism and park management activities.
- In the case of conditional management schemes, long-term access to some of the park resources.
- In the case of extractive reserves, higher incomes for local people.
- In the short term, the local population will be deprived of the benefits of hunting and gathering to the extent that these uses are prohibited. To the extent that protected areas provide a renewed source of game moving out into buffer-zone areas, long-term welfare will increase.

Conservation

- Protects biodiversity, representative ecosystems, and future development options.

Related Policy Issues

Land tenure

- Large amounts of land within national parks and other protected areas are in private hands. Many parks and reserved areas on public lands are being invaded.
- There is scant information on the number of settlements in national parks and often no land registry information.

Population

- Central America consists of seven countries covering 533,000 sq. km. The current population is 30 million. The average growth rate per year is 2.19 with a doubling time of 32 years. Forty percent of the population is under 15 years old, and more than half live in extreme poverty. Even after replacement fertility is reached, it will take an additional 25 years for the population to stabilize.

Agrarian reform and colonization

- Resettlement programs often locate settlers in areas that cannot sustain the new population and that would be better left in forest cover.

Indigenous peoples

- Most remaining forested areas are inhabited by indigenous peoples. Their ability to protect their traditional lands from invasion and to manage their forests' sustainability will be key to protecting those areas.

One hundred sixty-two protected areas in Central America have been recognized. They cover 5.4 million hectares, or 10.3% of the Central American territory. The total area theoretically declared covers 8.7 million hectares, or 16.3% of the territory of the 71 forest reserves, including Indian reservations. Most of the declared areas are "paper parks"; they are inadequately managed, have no clear physical limits, legal property titles or records, and no permanent institutional presence in the field (Fourth World Congress on National Parks and Protected Areas 1991).

The major threats to protected areas include inappropriate tourism development; concessions to transnationals for petroleum exploration and extraction; illegal deforestation; spontaneous land colonization; pirate fish and shrimp fishing; expansion of the livestock and banana industries; forest fires; urban growth; isolation of most conservation units; limited interest and political support; and contradictory policies among government sectors, inadequate authority and low priority given to conservation (Fourth World Congress on National Parks and Protected Areas 1991).

Although establishing a protected area changes its de jure tenurial status, de facto tenure may not change, essentially creating an open-access resource. Other parts of the government may also continue to ignore the de jure change of ownership. For example, ministries having responsibility for forestry, agrarian reform, and rural development may continue to allow timber concessions and colonization within and around the new protected area. Policy reform therefore must focus on both the national and community levels.

At the community level, management activities can increase the supply and/or reduce the demand for the resources contained within the protected area. Demand can be reduced through increased penalties and improved enforcement and by creating alternative sources of the income that is derived from the protected resources. Supply can be increased by developing alternative supplies in the areas surrounding the protected area, such as woodlots and captive breeding programs for wildlife. Community control of the regulation of protected areas, enhanced by some outside monitoring and administrative support, has the advantage of reducing the need for outside enforcement.

There are a number of distinct types of protected and managed areas that reflect the degree of human intervention and management objectives (Eidsvils1990).

Scientific Reserves and Wilderness Areas. A scientific reserve is an area of land, including where appropriate a coastal or marine element, possessing some outstanding or representative ecosystem, features and/or species of flora and/or fauna of scientific importance, available primarily for scientific research and/or environmental monitoring. A wilderness area is a large area of unmodified land, or land and water, retaining its natural character and influence, without permanent improvements or significant habitation, which is protected and managed so as to preserve its natural conditions. The area may contain ecological, geological or other features of scientific, educational, scenic or historic value

National Parks and Equivalent Reserves. A national park is a relatively large, natural area, including where appropriate a coastal or marine element, designated (a) to protect the ecological integrity of one or more ecosystems for this and future generations, (b) to eliminate any exploitation or intensive occupation of the area and (c) to provide a foundation for spiritual, scientific, educational and environmentally compatible recreational opportunities. Equivalent reserves are natural areas of similar character designed for the same reasons, variously called state parks, provincial parks, marine parks or tribal council parks.

Natural Monument. A natural monument is a significant natural or natural/cultural feature which is of outstanding or unique value because of its inherent rarity or representative qualities.

Habitat and Wildlife Management Areas. These are areas subject to human intervention devoted to the study of the requirements of specific species for breeding, feeding and survival, with the maintenance of sustainable populations and the protection of rare and threatened species as integral functions where relevant.

Protected Land and Sea Scapes. These are areas of land, with coastline and sea as appropriate, where harmonious interaction of people and nature has produced a scenically attractive area with unique or unusual patterns of human settlement, including villages and small towns of appropriate character, and/or traditional practices associated with nonintensive types of agriculture, grazing, forestry or fishing.

Resource Reserves. Resource reserves protect natural resources for future uses until management objectives can

be established. Examples are Kora and South Turkana National Reserves in Kenya and Brazil's forest reserves.

Natural Biotic Areas and Anthropological Reserves. These areas are designed to allow traditional societies to continue their way of life undisturbed by modern technology, usually with the caveat that they continue living in harmony with the environment. Examples are Xingu Indigenous Park in Brazil and the Central Kalahari Game Reserve in Botswana.

Transnational Parks. Ecosystems are not bounded by national boarders. In the last five years, interest in establishing protected border areas has been growing. Examples are Trifinio or Biosfera de la Fraternidad Reserve (Guatemala, Honduras and El Salvador); La Amistad Reserve (Costa Rica and Panama); and SIAPAZ, Protected Areas for Peace (Nicaragua and Costa Rica).

Other cooperative efforts are: Rio Coco/Bos Awas/Rio Platano/Tawahka Project (Honduras and Nicaragua); Chiquibul/Mayan Mountains Project (Guatemala and Belize); and Calcakmul, Mirador/Rio Azul and Rio Bravo/Lamanai, an initiative for establishing a protected area system of Gran Peten-SIAPAZ (Mexico, Guatemala and Belize).

RESOURCE MANAGEMENT AND THE LOCAL COMMUNITY

KEY POINTS

- **Management strategies provide incentives and disincentives to resource use by local communities. These inducements are intended to change the benefit-cost calculations of resource users.**
- **Economic incentives that reflect the management requirements of ecosystems are required to support institutional and legislative mechanisms.**
- **Management schemes should maximize direct economic benefits to communities surrounding protected areas.**

The discussion and mini-cases presented in this section are drawn from Jeffrey A. McNeely, *Economics and Biological Diversity,* International Union for Conservation of Nature and Natural Resources, 1988.

Incentives and disincentives target different user groups in the service of a variety of objectives generally designed to reduce the need for residents to degrade the protected area by, for example, improving the productive capacity of communities adjacent to protected areas, reducing agricultural pressure on marginal lands, compensating villagers for income lost because of new use restrictions, developing other income-generating activities and increasing employment opportunities for local residents.

Three general categories of incentives and disincentives can be used to promote conservation at the community level: direct cash incentives (rewards, fees, compensation for losses, grants, loans); in-kind incentives (food, livestock, access to resources); and fiscal incentives.

Direct Cash Incentives and Disincentives

Cash incentives must be clearly linked to changes in behavior. For example, entry or user fees can be returned to local communities as an incentive for complying with the management objectives of a protected area. The allocation of a portion of the revenues from the protected area to community development projects can also be tied to community management schemes. Care must be taken not to create perverse incentives to exceed the area's carrying capacity.

Cash rewards for outstanding service and/or reporting illegal harvesting are usually more effective incentives for controlling the activities of outsiders. Cash compensation can be given for damage done by wild animals protected in the reserve or for not using resources that were previously available.

Subsidies have been used to stimulate a variety of activities, for example, reforestation or development of butterfly ranches, crocodile farms or wildlife management projects that reduce pressure on species in the protected areas. Farmers can receive income support for retiring land in environmentally sensitive areas or in protected areas.

Credit at favorable terms can enable individuals and communities to invest in the productivity of their own lands through improved production technologies, better access to markets, improved packaging and collective negotiation for better market prices. Short-term loans to villagers can be provided by revolving funds, which are usually managed by a community organization.

Wages can be paid to residents of buffer zones for a variety of conservation activities: reforestation, soil conservation, farming of traditional crop varieties, construction of trails and firebreaks, etc. Experience indicates that this works better on communal lands or in protected areas, and with a community cooperative responsible for project design and payments.

To be effective, fines must be greater than the expected value of the resource being poached (i.e., the market value times the probability of being caught and convicted). Fines can be returned to communities with local leaders assigned policing responsibility.

Mini-case

Amboseli National Park in Kenya provides the Masai pastoralists with several incentives to help protect the park's resources:

- *A water diversion system to pipe water from the park to artificial swamps outside the park for the Masai cattle.*
- *A grazing compensation fee to cover livestock losses due to wildlife migrating from the park onto Masai lands.*
- *The Masai control hunting and cropping on their land and receive subsidies to accommodate tourist campsites and lodges.*
- *The park headquarters includes a community center, school and medical facilities*

Results: *Net monetary gain to the park from use of Masai lands is about $500,000/year, and the Masai receive an income that is 85% greater than they would obtain from livestock alone.*

Mini-case

Economic incentives for Ban Sap Tai, a village at the edge of Khao Yai National Park, Thailand.

The following package of incentives was established to halt poaching and encroachment into the park:

- *A trekking program using villagers as guides and porters.*
- *Establishment of an Environmental Protection Society (EPS) that functioned as a community-based credit cooperative, education center, and collective business enterprise. The EPS established a revolving fund and a cooperative store.*
- *Training for villagers in management and administration of cooperatives and the revolving fund.*
- *Community woodlots.*
- *Food-for-work program for community development projects.*
- *Technical training in improved cultivation techniques, conservation of forests, soil and wildlife, and basic business skills.*
- *Training of village health volunteers to provide health and family planning services.*
- *A cooperative program between EPS and Khao Yai Park to reforest park lands previously under illegal cultivation and demarcate the park boundary.*

Results: *Encroachment on park lands has been halted, existing farms inside the park removed, and poaching greatly reduced. The program has been expanded to adjacent villages.*

In-Kind Incentives and Disincentives

Disincentives can include jail sentences, confiscation of land or elimination of use rights. Disincentives require institutional capabilities for applying them.

Incentives include goods and services that are provided to individuals, communities and institutions in order to change their resource use behavior. Food for work is most effective with specific, well-defined projects and has been used where communities do development or conservation work in exchange for food. Improved breeds of livestock can be used as an incentive to increase productivity, thereby reducing pressure on marginal lands.

Experience has demonstrated that equitable access to resources in protected areas is a powerful incentive for the surrounding communities to conserve resources. Some ex-

amples are building materials, thatch grass, meat, extractive products, and the direct profits from uses of the protected area.

Extractive reserves or extractive forests remain in the public domain but are occupied by groups that use the area's resources under a land-use concession subject to pre-established management conditions. The state gives exclusive use to practitioners of traditional extractive activities, usually for a minimum of 30 years. Theoretically, this form of management would allow the state to control or mediate the impact of outside development interests and help to prevent the subdivision of land into small private units that accompany colonization (Anderson 1990).

Mini-case

Zimbabwe's Matobo National Park gives thatch-collecting licenses to women nominated by village elders. Licenses are contingent on local people abiding with park regulations. The women harvest the thatch according to a pre-determined annual quota and give the park one bundle for every ten cut. The park's share is used for roofing park facilities. Annual quotas provide the community with an income ranging from $20,000 to $60,000.

Results: *Poaching, wild fires, and cattle trespassing have been reduced along with costs for pasture management.*

Fiscal Incentives and Disincentives

Fiscal incentives direct funds toward conservation activities in and around protected areas. They can include taxes and tax exemptions, tariffs, price supports, insurance, guarantees, preferential access to credit and debt swaps. Foreign governments and international lending agencies can provide fiscal incentives to develop economic polices that promote investment and employment in sustainable use activities around conservation units.

Disincentives have not been used much in Central America. Examples are refundable damage deposits attached to forest concessions in parks and buffer zones, taxes as disincentives to environmentally destructive land development, or pollution taxes on industries locating in environmentally sensitive areas in and around buffer zones.

Tax deductions, exemptions and credits may be offered to individuals or corporations and applied to taxes (on land, income, sales, inheritance or capital) in return for conservation-related behavior in or around conservation units. Effec-

tiveness presupposes government ability to levy and collect taxes. Tax incentives tend to be more useful for large land owners and commercial operations than for small farmers that operate outside of the tax system.

Import taxes and duties can be waived for equipment that is required for activities supporting conservation. Increased depreciation of investments can be offered to encourage investment in appropriate tourism and eco-development such as butterfly ranches, wild game ranches, and multi-use sustained management private forestry.

Services can be provided to communities in buffer zones or conservation units as compensation for not using resources that were previously available. Examples are accelerated development aid, education, improved health care and rural electrification. These kinds of indirect incentives function best as part of larger rural development efforts. National plans and development strategies can give these areas priority attention from national and international development agencies.

Social incentives can be structured to change behavior. Experience indicates that the strong community institutions, enhanced land tenure, training, education, and employment associated with maintaining the conservation units are powerful incentives for local populations to protect and support the management objectives of conservation units.

FINANCING

KEY POINTS

- **Financing mechanisms most commonly used are government budgets and foreign donations by international development agencies and conservation organizations. Other sources such as food sale franchises, souvenirs and crafts are not common. Income from entrance fees and individual donations is small.**
- **Trusts and private administration of funds from debt swaps and international donations are becoming more common sources of funding.**
- **The amounts available per protected area have been decreasing due to growth of the number of protected areas, inflation and devaluation of national currencies, and structural adjustment conditionalities.**

The discussion and mini-cases presented in this section are drawn from Jeffrey A. McNeely, *Economics and Biological Diversity,* International Union for Conservation of Nature and Natural Resources, 1988.

Money can be allocated as a regular national budget or as a special budget. Bilateral agreements or cooperative efforts with international agencies can include elements with support incentives for sustainable development of buffer zones and park management.

Protected areas should earn a fair return on the money they bring into the economy. This can be generated by bed taxes for tourist hotels, departure taxes at airports, and franchises for operating nonextractive concessions (such as hotels, tours and restaurants). These funds can be used to develop incentives for conservation and management of protected areas. They must, however, be monitored and revokable if agreed-upon conditions are not met.

Entrance fees, which are a measure of willingness to pay, should be used to manage the protected area and provide support economic incentive packages for surrounding villages. They must be tied to management objectives and their impact must be regularly monitored because they may function as a perverse incentive to maximize revenue, re-

sulting in over use of park resources. A two-tier fee system, with higher charges for international visitors and lower fees for residents, is an equitable means of increasing revenue.

Janzen suggests that protected areas diversify their endowments portfolios to include ownership of adjacent agricultural lands. The areas would benefit from agricultural profits to support management of the area and would be able to control the kinds of agriculture carried out on neighboring lands.

Irrigation projects or hydroelectric installations dependent on water from a protected area can implement water charges to improve the efficiency and equity of water use and generate funds for managing and protecting the watershed. As an indication of the value for watershed protection, Hufschmidt and Srivardhana (1986) showed that annual expenditures of $1.5 million would be justified in terms of benefits to the Nam Pong Reservoir in northeast Thailand.

Special taxes on timber extraction, wildlife and wildlife products, and concession rights can be used to set up special funds for appropriate development activities in and around protected areas.

Large development projects supported by external funds can pay an "environmental maintenance tax" by allocating funds for identifying, establishing and managing protected areas, and creating a self-sufficient endowment fund for continued management. Variations on this theme include mandatory investment of a percentage of the total project costs in reforestation and conservation activities; and conditionalities attached to extractive concession agreements that require the concession holder to provide resources, activities, and support for various incentive programs aimed at maintaining the long-term productivity of the area.

Voluntary private-sector support activities that rely on the same protected area or natural resource can also be sources of funds for sustainable management and protection efforts.

Mini-case

The Ivory Coast created an environment fund from taxes imposed on oil tankers docking in the country. The fund is used to purchase equipment for monitoring ecosystems, preventing pollution, and improving environmental management.

Mini-case

Florida's Recovery and Management Act establishes a Hazardous Waste Management Trust Fund financed by a 4% excise tax on disposal until the fund reaches $30 million and a 2% excise tax thereafter.

Mini-case

The International Trust for Nature Conservation, established by the Tiger Mountain Group in Nepal, invests excess profits from nature tourism into local conservation activities to help protect wildlife and its habitat. One such activity is a conservation education program for the villages surrounding Royal Chitwan National Park.

Mini-case

When large tracts of land are held in both government and private hands, they can be traded to benefit both private-sector interests and protected areas.

In March 1988, U.S. legislation authorized the federal government to give title for 11,000 ha of public lands in Nevada to Aerojet-General Corporation. In exchange, the government received 2,000 ha of wetlands in Florida owned by Aerojet, which will be sold to the South Florida Water Management District for $2.4 million. The U.S. government will use the proceeds of the sale to purchase additional lands in two national wildlife refuges in Florida.

International NGOs

International NGOs, usually based in the U.S. such as Conservation International (CI), The Nature Conservancy (TNC), World Wildlife Fund (WWF), and World Conservation International (WCI), have large protected-area programs. They can often provide seed funding to get appropriate incentive projects started.

The Nature Conservancy is creating Conservation Trust Funds throughout Latin America. These funds will receive capital through large-scale debt-for-nature swaps to be used to guarantee secure funding for local conservation efforts.

Mini-case

The Nature Conservancy's Parks in Peril Program is a public/private partnership to safeguard "paper parks" of the western hemisphere by building a basic conservation infrastructure, integrating conservation areas into the economic and cultural needs of surrounding communities, and creating long-term funding mechanisms to sustain local management.

Foundations, Trust Funds and Endowment Funds

These are legally established organizations set up as corporations or limited-liability charities to receive donations from private and public enterprises in support of efforts to manage and conserve protected areas. Foundations or trusts provide grants for specific activities, subsidies for ongoing costs and loans. Foundations are governed by boards and audited accounts are publicly available.

Mini-case

The Indonesian Wildlife Fund was established by the Ministry of Forestry to receive voluntary contributions from the timber trade. An independent board of directors allocates the funds to local conservation projects.

Mini-case

The Zambian Conservation Revolving Fund was established by the National Parks and Wildlife Service to receive income from the harvest of hippos and auctions among safari hunting companies. Local chiefs receive 40% of the proceeds from auctions, and 60% goes to wildlife management. Poaching has decreased dramatically, and manpower in the protected area has increased.

PL-480 Funds

Local currency counterpart funds derived from PL-480 enable certain nations to pay in local currency for food imports from the United States, with the local currency to be spent in the importing nation.

Mini-case

In 1987, Conservation International (CI) purchased Bolivian debt worth $650,000 from Citibank of New York for $100,000. CI canceled the debt in return for an endowment fund in local currency worth $250,000 to cover the operating costs of managing the Beni Biosphere Reserve. USAID contributed PL-480 local currency funds worth $150,000. The government of Bolivia agreed to provide maximum legal protection and to demarcate a buffer zone around the reserve.

Mini-case

In 1987, the Natural Resources Conservation fund was created by the Costa Rican government to allow the National Parks Foundation to exchange $54 million in debt for 75% of the debt's face-value amount in local currency government bonds that would mature in six years paying 25% interest. Proceeds were used for park management, land purchase, deforestation control and environmental research. In 1989 the program was expanded to convert up to $15 million a year for three years by offering 20-year bonds.

Foreign Aid

Many aid agencies have begun to invest in protected areas in Central America. Examples are USAID, ACDI, ASDI, DANIDA, NORAD, GTZ, the German Reconstruction Bank, the Inter-American Development Bank, the World Bank and the European Community.

In 1989, Central America received $16 million from foundations, NGOs and the U.S. government to study or protect biodiversity.

Joint Government-NGO Financing

International NGOs have channeled USAID funds and funds from private foundations into protected areas. Examples are (1) RENARM Project implemented by Cultural Survival and two consortia (PACA composed of CARE and TNC and Paseo Pantera composed of WCI and CCC); (2) Mayarema Project in Peten, Guatemala; (3) LUPE in Honduras; (4) Marena in Panama; and (5) Boscosa and Foresta in Costa Rica.

Mini-case

In 1990, the U.S. Congress, enacted the first direct appropriation for a debt-for-nature swap in Panama, using up to $15 million in USAID funds. The swap will convert up to $100 million in Panamanian commercial debt for a Conservation Trust Fund to protect the Panama Canal watershed and several million acres of tropical forest.

Debt-For-Nature Swaps

In 1987, Conservation International carried out the first debt-for-nature swap in Bolivia. There have been twelve additional swaps in which NGOs have used private and public funds to purchase a country's commercial debt on the secondary market at prices ranging from 11% to 33 % of face value. The debt is exchanged with the debtor country for local currency in the amount of the face value of the debt, which is then invested in conservation, either directly or in bonds (CDIE 1991; Chew, 1991).

Benefits:

- Governments reduce their external debt and consequently the amount of foreign currency owed on principal and interest.

- Banks reduce their exposure to risky debt, recover a portion of a debt that may otherwise be uncollectable and receive a tax benefit. Banks can also donate their debts and receive tax benefits.
- The NGO obtains a favorable rate of exchange in local currency, which is invested in bonds or in project activities.

Constraints:

- Much of the debt is not commercial debt and is therefore not traded in secondary markets.
- Effective NGO intermediaries are a critical element. In many cases, the lack of credible NGOs has slowed the process.
- There is a need to protect against inflation and local currency devaluation.
- Governments have been more interested in debt-for-equity swaps in the industrial sector or other private investment.
- Governments must print local currency bonds, which increase the money supply and have an inflationary effect. TNC commissioned a study to assess this impact in Costa Rica. The study concluded that the inflationary impact would be less than 0.5 percent if Costa Rica were to spend $50 million in local currency generated by swaps in one year. The problem becomes smaller as the term of the bonds increases.

Bilateral Debt-For-Nature Swaps

The Enterprise for the Americas Initiative calls for the U.S. to reduce and restructure loans for Latin American and Caribbean countries with serious debt-servicing problems. The U.S. will negotiate reductions in principle and accept interest payments in local currency to be placed in a trust to support environmental programs when countries: (1) "Adopt strong economic reform programs in conjunction with the IMF and World Bank; (2) pursue comprehensive investment reforms with the Inter-American Development Bank or other multilateral institutions; and 3) complete commercial bank debt reduction as appropriate." (Chew 1991; Serafino and Cody 1990)

INTERNATIONAL CONVENTIONS AND SUPPORT

KEY POINTS

- **Successful long-term management of protected areas requires international cooperation because ecosystems extend beyond national borders.**
- **International treaties provide binding, legal obligations that become the basis for national implementing legislation. These treaties establish the same obligations for all parties and provide an institutional setting for cooperation (Navid 1992, 197).**
- **International treaties are most successful when they provide regular information exchange, a coordinating secretariat that interacts with governmental and nongovernmental organizations, and an effective reporting and review system (Navid 1992, 198).**

Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar, 1971)

Under this convention, parties agree to use wisely the wetland resources under their jurisdiction, to designate for conservation at least one wetland of international importance, and to establish and protect wetland reserves regardless of their international importance. A Wetland Conservation Fund with an annual budget of about $660,000 is available to help nations meet their obligations. By 1990, 61 countries had designated 421 sites covering more than 30 million hectares. The secretariat is provided by IUCN (Fourth Congress Mundid de Parques y Areas Protejidas, Caracus, Venezuela 1992, 16–7).

Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972)

The World Heritage Convention (in force since 1975) recognizes the obligation of governments to protect unique natural and cultural areas and the obligation of the international community to help pay for conservation efforts. Each party to the convention must contribute to a fund to support these sites and related research. Contributions are set at 1 percent of each party's contribution to the annual

budget of UNESCO. The secretariat is also provided by UNESCO (Fourth Congress Mundid de Parques y Areas Protejidas, Caracus, Venezuela 1992, 16–17).

Mini-case

At the urging of the World Heritage Convention, the federal government of Australia has offered Queensland a package of subsidies worth $71.6 million as compensation for income that will be lost through cessation of extractive uses. This package includes subsidies for public works, reforestation, World Heritage Area management, private and community initiatives, adjustment assistance, and business compensation for those affected by the discontinuation of logging inside the World Heritage Areas.

FAO International Undertaking on Plant Genetic Resources (Rome, 1983)

This is a voluntary agreement among nations to support the principle that plant genetic resources are the common heritage of humankind. A Commission on Plant Genetic Resources has established an International Fund for the Conservation and Utilization of Plant Genetic Resources based on voluntary contributions. The secretariat for the commission is housed at FAO.

NATURE TOURISM

KEY POINTS

- **Nature tourism plays an important role in some Central American economies, but potential revenue sources are not fully mined.**
- **Earmarked taxes can ideally be used to support a specific park or park system, but it is very likely that other sources of support will also be needed.**

Nature tourism, which is a significant element in Costa Rica and Belize, has some potential throughout the Central American region. Nature tourism "involves traveling to relatively undisturbed or uncontaminated natural areas with the specific object of studying, admiring and enjoying the scenery and its wild plants and animals, as well as any existing cultural areas" (Lindberg 1991, 23).

The socioeconomic benefits of nature tourism function as incentives for: (1) establishing and maintaining conservation units; (2) stimulating investment in sustainable utilization of natural areas; and (3) encouraging governments to put in place more favorable packages of supportive policies and incentives.

Three broad problems are associated with nature tourism: (1) nature tourism is no panacea for funding conservation activities, and other sources of funding will be needed; (2) nature tourism must be controlled so that the resource carrying capacity is not exceeded; and (3) much of the revenue potential from nature tourism has not been tapped.

Tourism can damage the often fragile natural areas and may also have unintended negative effects on other sectors. For example, tourists in Costa Rica use large amounts of electricity. The profits generated per tourist visit could be compared to the costs of producing additional energy, including the long-term environmental costs of hydro-electrical facilities.

Nature tourism can provide funding for development programs near parks as well as increase demand for local goods and services. Several specific revenue issues should be considered. First, a multitier entrance or user fee structure will allow more revenues to be captured from foreign tourists with higher incomes while permitting lower fees for nation-

als. Such systems exist in Costa Rica, Guatemala, and several other countries. Second, current fees are generally very small, and even large increases are unlikely to negatively affect visitors. In addition, visitors will be even more likely to pay more if they understand that part of the fee is earmarked for conservation of the site. However, earmarking may pauper some parks and make others well-off if a distributional system is not established. Parks often still need help from the treasury.

Fees also should be adjusted for inflation and changes in demand. In Costa Rica, fiscal stamp fees, which help to finance the park system, can only be increased by the legislature; they have not been raised in eleven years. While entrance fees can be changed by executive order, the increases have not reflected inflation (Lindberg 1991, 23).

Mini-case

"In Costa Rica, proprietary funds from entrance fees (including fiscal taxes) complement the general government allotment. The Costa Rican case shows the importance of earmarking. Although the government is aware of the value of conservation, park budgets declined in real terms during an economic downturn. Proprietary funds also declined in real value, but the Costa Rican conservation community was able to mount enough support for the funds to resist government pressure to eradicate them altogether under an austerity program mandated by the International Monetary Fund. The funds were less susceptible to elimination because they were independent of the central government treasury." (Lindberg 1991, 6).

Indigenous Peoples

KEY POINTS

- Most remaining forested wildlands areas in Central America are occupied by indigenous groups (National Geographic Society 1992). These areas have remained in forest cover because they have been inaccessible to outside development interests. The groups inhabiting them have evolved usufruct strategies that have not exceeded the forest's regeneration capacity; these groups' lack of access to large-scale extraction technologies has also served to protect the land.
- Ensuring long-term sustainable use of these forest resources and preserving their biodiversity will require policies that promote convergence of the interests of indigenous peoples, conservationists and political forces.
- Security of tenure is the basis of cultural identity and self-determination for indigenous people, who may view conservation measures as means to that end. Their alliance with conservation organizations does not guarantee a long-term convergence of interests unless conservation projects are supportive of local economic and social development objectives.
- Indigenous models of land use and management in tropical rain forests maximize the number of crops produced in order to minimize the risk of crop failure. It is not clear if these management strategies can be sustained outside their cultural settings and/or be adopted by settler or non-native groups.
- The World Bank's experience in Latin America indicates that sustainable management and conservation require recognizing, demarcating, and protecting indigenous land claims, and incorporating indigenous knowledge and interests into planning and development.
- The indigenous peoples occupying these areas offer an extremely cost-effective alternative for managing large tracts of forests in an integrated fashion through communal ownership.

- **Indian groups have not been participants in the decision-making and planning processes that affect the use of their lands and resources. Giving these groups control over their traditional lands can be a powerful force for sustained management of the remaining forested wildlands areas.**

All of Central America's remaining forested wildlands areas, including established protected areas, are being rapidly destroyed by invading colonists, overcutting of fuel wood, uncontrolled harvesting of timber products and industrial development. This problem exists because of the difficulty of establishing enforceable and exclusive property rights over a common or joint-access resource.

Attempts to establish private property rights have focused on individual ownership of small tracts of land. Because indigenous lands are held communally, they are not legally recognized—a situation that has allowed landless colonists to invade communally managed forested lands and claim title. The result has been the graduai destruction of both forested wildlands and the cultural integrity of the indigenous inhabitants.

Security of tenure is the basis of cultural identity and self-determination for indigenous people, who may or may not view conservation measures as means to that end. Consequently, their alliances with conservation organizations do not guarantee a long-term convergence of interests unless conservation projects are supportive of local economic and social development objectives.

Attempts to improve security of tenure over traditional lands for indigenous groups have focused around four policy themes:

- management of parks, Indian parks, extractive reserves and protected areas;
- application of international human rights agreements;
- changing values and moral persuasion; and
- development of national legislation.

While the state usually retains control of indigenous lands and recognizes community ownership of property, it promotes small private holdings and colonization laws under the pretext of increasing productivity and moderniza-

LIKELY IMPACTS OF PROTECTING INDIGENOUS LAND RIGHTS:

Growth

- The impact on short-term economic growth is likely to be small.
- Over the long term, successful management of the forests for a sustainable yield can be achieved with participation by indigenous groups and would have a measurable, positive impact on economic growth. The yield will depend on particular products identified by forest dwellers and potential spin-offs from industrial application.

Welfare

- The impact on welfare indicators is mixed. Members of indigenous groups would benefit from having control over traditional lands and the opportunity (or requirement) to manage them on a sustainable yield basis. The potential for higher income, maintenance of communal ownership and management of assets, and greater political security would accrue to indigenous peoples.
- People who are now using traditional lands for agriculture and livestock activities and government-sponsored and spontaneous colonization would lose the benefit of exploiting frontier lands.
- General welfare is enhanced to the extent that the maintenance of large tracts of forested lands contributes to the provision of environmental services on a regional basis and preserves options value for future generations.

Conservation

- The implementation of policies that merge conservation goals and the rights of indigenous peoples over humid tropical forests would further environment and natural resource goals.

tion. There is no law with respect to indigenous land titling and no coherent legislation and policies to rescue lands of indigenous groups.

With the exception of the new constitutions of Nicaragua and Guatemala, national constitutions in Central America do not recognize indigenous populations. In almost all cases, there exists some law or decree obligating the state to provide services and take special measures in favor of improving the social and economic conditions of indigenous populations. Although some national legislation speaks of "respect for uses and customs of the indigenous peoples," this sentiment is not formally codified and generally is ignored in the application of the law.

Constitutional law and legislation on land tenure, water rights, civil status, and educational policies have been shaped by the values and assumptions summarized below (Stavenhagen 1991, 35; United Nations 1991).

Old Values. Indigenous cultures are inferior to the national culture; they are traditional, archaic, simple, parochial and primitive. The national culture represents progress, development, modernity, civilization, technological and social complexity, and prosperity.

Old Assumptions. Indigenous groups stand in the way of national development, growth and prosperity. The "indigenous problem" is the result of socioeconomic isolation. Lack of economic integration and physical isolation explain their backward technology, illiteracy, ignorance, lack of skills and parochial and traditionalist world view.

Old Policy Guidelines. These values and assumptions logically have led to policies that stimulate economic, social and cultural change and integrate indigenous populations into modern social and economic development, ensuring the erosion of their culture, the gradual shrinking of traditional territories, and the disappearance of identifiable indigenous groups.

New Values. The concern for ensuring long-term economic sustainability requires making public choice tradeoffs between growth today and growth tomorrow. This focus leads to valuing the preservation of future options, valuing resilience over efficiency, and to an increased valuation of benefits and costs that are not reflected in the market, such as environmental services.

New Assumptions. Diversity of all kinds is a source of adaptive strength and resiliency. Healthy participatory democratic processes are the only known way to foster transparency, oversight, and the kind of informed bargaining and negotiation between competing interests that can address public choice trade-offs. Protecting human rights and upholding democratic processes are inseparable.

New Policy Guidelines. More and better information will lead to better policies. The potential winners and losers of resource allocation decisions should be empowered to participate in the policy formulation and planning processes. Resource management should be decentralized with the users involved in implementation.

The old set of values in Central America that underlie the policy choices for dealing with indigenous people are the same as those found in North and South America. In its worst form, the old set of values leads to extinction; in its most benign form, it leads to assimilation into the dominant culture and loss of native cultures.

Recognition of the rights of indigenous peoples has strong international support. (See the section on International Conventions and Support.) That support, however, is rarely transformed into programs that protect the rights of native populations within national boundaries.

The new set of values described above proposes an alternative to assimilation or extinction and establishes a programmatic link with the conservation and natural resource management goals of nation states. It is based on the proposition that indigenous peoples have developed management technologies to harvest a wide variety of products from the tropical humid forest in a manner consistent with sustainable use of the forest.

The preservation and sound management of humid lowland forests can be enhanced by directly incorporating the goals of indigenous peoples into national goals for conservation and management of natural resources. This can be done by recognizing and protecting indigenous land claims; using the knowledge of indigenous populations on a variety of products that could be harvested and marketed; using the time-tested technologies for extraction of some products as the foundation for research and development; and maintaining the low people-to-land ratio that is common to forest dwellers.

RESOURCE MANAGEMENT

KEY POINTS

- **Any protectionist policy requires controlling technology and the relationships between communities within the protected area and the outside world.**
- **Customary owners are generally very practical about comparing the potential returns from various management schemes.**
- **As protected areas become exposed to development pressures, it is increasingly difficult to exclude nontraditional technologies and limit people's life choices.**

Various management strategies have emerged for fostering the merger of conservation goals with those of indigenous populations (Clay 1991; Poole 1989). In the absence of adequate laws and enforcement capabilities, management strategies that structure use incentives and specify behavior are important policy tools for achieving convergence of interest between indigenous groups and conservation goals.

The terms of management strategies must ultimately address how gains and losses are distributed; who decides on use levels or rates of extraction and by what process; who makes choices about alternative uses and assesses the opportunity costs of forgone benefits; and how compensation is provided.

As protected areas become exposed to development pressures, it is increasingly difficult to exclude nontraditional technologies and limit people's life choices. Indigenous peoples cannot be denied health care, and increased populations require enlarged hunting areas and/or new food sources leading to more extensive and/or intensive agriculture. Customary owners are generally very practical about comparing the potential returns from various management schemes.

Exclusion from Parks and Protected Areas

Indigenous peoples have been excluded from protected areas either because hunting and gathering are prohibited or because the reserve is for nonnative sports hunters only Exclusion of indigenous peoples is more common in former British colonies. This practice has resulted in a variety of perverse outcomes: continued invasion of park boundaries, social breakdown, population explosion of previously hunted animals and diversion of the benefits of resource use to outside groups.

Experience indicates that these outcomes can be largely avoided when indigenous groups are involved in the planning and management of protected areas.

National Parks and Indian Parks

The objective in designating land as a national park or Indian park is to protect and preserve its present state with no human modification. While indigenous populations are accommodated as "part of the natural order," they are denied the right to change and develop such lands. Examples are Xingu National Park, Brazil; Aripuana Indian Park, Brazil; Yanomami Park, Brazil; Lauca National Park, Chile; and Manu National Park, Peru.

Conditional Occupancy and Use

Conservation agencies may impose restrictions on the technologies used and the manner of resource use. Insistence on "traditional" or "subsistence" technologies essentially excludes indigenous land use when it evolves beyond arbitrarily defined limits of the approved form, or as social and economic pressures cause migration from the park area.

Extractive reserves and extractive forests are a form of conditional occupancy. To be viable, these must allow extractive activities to evolve to generate new forms of economic activity. (Allegretti 1990).

Priority Use

Resources shared with nonaboriginal users can be allocated on priority basis, with highest priority given to subsistence uses.

The conditions imposed on methods of resource utilization are often more diligently imposed on indigenous resi-

dents than outside users; indigenous people have often been asked to curtail traditional practices to preserve a resource, while outside groups have been allowed access to the same resource.

The World Conservation Strategy suggests that allocation among native users be left to the indigenous community and that the surplus be shared between native groups and other users for commercial or recreational purposes.

Lease-Back Provisions

Title to parks and protected areas can be given to indigenous communities and then leased back to conservation agencies.

Indigenous participation in managing and protecting aboriginal lands requires a flexible approach that conflicts with state government's predisposition to centralize power. This conflict may be partially solved by a strong NGO role.

Mini-case

Kakadu and Coburg National Parks, in Australia, were first passed to aboriginal ownership and then leased back as park land. The management agreements specify the role aboriginal populations have in policy formulation, planning, training and employment.

Compensation for Conservation

Indigenous inhabitants can be compensated for the forgone benefits and/or direct losses they sustain as a result of the area's protected status.

Mini-case

Amboseli National Park in Kenya devised a formula for an annual fee to compensate the Masais for lost grazing opportunities when park animals entered Masai lands. Revenues from campsites and lodges were redirected to local communities.

Biosphere Reserves

This concept evolved in Latin America to respond to two conditions: (1) most surviving wildlands are occupied by indigenous peoples; and (2) national parks and other conservation areas are exposed to colonization and industrial development. The biosphere reserve is a complex of conservation units that includes protected core areas surrounded by buffer zones in which varying intensities of resource ex-

ploitation are permitted. These permitted resource uses provide lower but sustainable revenues for the benefit of local communities rather than outside interests. Examples are the Proyecto de Estudio del Manejo de Areas Silvestres de Kuna Yala or Udirbi Park; Darien National Park, in Panama; Rio Platano, in Honduras; La Amistad, in Costa Rica and Panama; and Maya Biosphera, in Guatemala.

The concept attempts to diffuse change in the surrounding regions through dissemination of information, experimentation, demonstration, persuasion and education. The success of maintaining special conservation areas is dependent on the cooperation of local communities and the extent to which they receive the benefits flowing from conservation.

The two recognized key ingredients are conservation initiatives by indigenous groups and active involvement of conservation NGOs. Indigenous groups, however, are not generally empowered to undertake autonomous conservation measures.

A third ingredient for success must be innovative institutional arrangements for risk-sharing and for investing and distributing the revenue from resources that do not lend themselves to short-term, regular and discrete yields. Analogies might be indigenous natural resource mutual funds or the revenues that Saudi citizens receive from their oil resources

Management and Research

Indigenous groups have historically "managed" their resources through a variety of mechanisms. The new management problem arises because outside interests are competing for these resources in ways that the market recognizes as more profitable, at least in the short term.

Management mechanisms must incorporate new ways to establish market value, allocate and delimit use rights, and choose among competing uses. Indigenous groups can contribute to this process through research and direct administration of the natural resources on which they depend. Experience indicates that their involvement leads to improved and more readily accepted and enforced management.

Mini-case

The Alaska Eskimo Whaling Commission, Eskimo Walrus Commission, and the Caribou Management Boards monitor wild populations, conduct scientific research aimed at ensuring the continued existence of species within traditional use, develop management plans, and generate local community compliance with good conservational practices.

Mini-case

The Makivik Research Center in Quebec develops indigenous scientific research capacity; initiates and conducts wildlife research and management projects that respond to Inuit needs; collects, analyzes and disseminates scientific and technical information to Inuit; and provides training and education in wildlife research management.

Mini-case

Wildlife Management Areas in Papua, New Guinea remain under customary ownership, and landowners select a management committee to control hunting. There is no tenure transfer, and flexible management leads to regulations that are responsive to local needs.

Forest Parks and Refuges Catering to Ecotourism

Indigenous groups can convert their traditional lands into parks and protected areas.

Mini-case

The Kuna Proyecto de Estudio del Manejo de Areas Silvestres de Kuna Yala (PEMASKY) is a conservation area initiated and managed by the Kuna. The boundary is patrolled by park guards and marked by a four-meter cleared trail, concrete markers, and notices of penalties for hunting and clearing land. The management concept is being expanded to include an agroforestry component.

Recreational Development

In general, indigenous communities have not been receptive to large-scale tourism projects and have not benefited from them. They have, however, been receptive to small-scale, high-paying developments such ecological tourism, activity tourism, and sports hunting and fishing. Indigenous groups that have wanted to benefit from ecotourism have had little support from tour companies.

Protection of Boundaries

All indigenous lands, whether legally established as indigenous reserves or protected areas, have been invaded by colonists. A clearly marked boundary, patrols for surveillance, and legitimate procedures for warning and evicting colonists are required to thwart such invasions. The problematic legal status of many indigenous areas and weak enforcement mechanisms of the nations' legal systems make evictions through standardized legal procedures difficult or impossible. As a result, some communities have assumed protection responsibilities through informal methods.

Mini-case

The Awa Ethnic Forest Reserve in Ecuador uses an innovative method of showing conspicuous conventional land use. The Awa cleared a 12- to 15-meter strip around the reserve's perimeter and planted it with fruit and hardwood trees, established nurseries at potential entry points, and developed a strategy to colonize a planned entry road.

Economic Development Projects

Development projects in the buffer zones surrounding biosphere reserves provide sustainable alternatives to monoculture, logging and colonization. They may include adding value locally through secondary processing, agro-forestry, realizing economic value of wildlife conservation and environmental rehabilitation. Based on his experience in Latin America, Smith (1987, cited in Poole 1989) suggests that development projects should meet four criteria:

- The indigenous community controls conceptualization, planning and implementation.
- The indigenous community exercises control over its territory and the resources within its territorial limits.
- The program promotes self-sufficiency and economic independence for the community.
- The development processes strengthens social and cultural community bonds.

INTERNATIONAL LEGAL INSTRUMENTS

KEY POINTS

- **Sustainable use of the remaining forested areas in Central America will depend on the way in which**

the rights, protections, and responsibilities of the indigenous groups occupying them are specified.

- **International human rights agreements primarily protect individuals. Individual versus group ownership, however, is a key policy issue because of the important role that secure land tenure plays in the sustainable use of forest resources.**

International human-rights agreements provide the initial legal basis for addressing the incursion of outside development interests. International human-rights law mobilizes, and offers a common framework for, national legislation (Indian Law Resource Center 1984, 50–58; Davis 1988).

UN Charter

All member countries have a legal obligation to promote and encourage the rights and protections identified in the UN charter. Article 55 states, " . . . based on respect for the principle of equal rights and self-determination of peoples, the United Nations shall promote . . . universal respect for, and observance of, human rights and fundamental freedoms for all without distinction as to race, sex, language, or religion."

The **Universal Declaration of Human Rights,** Article 17 states, "Everyone has the right to own property alone as well as in association with others," and "No one shall be arbitrarily deprived of his property." Article 27 states, "Everyone has the right freely to participate in the cultural life of the community . . . ."

The **International Covenant on Civil and Political Rights** is binding on Costa Rica, El Salvador, Nicaragua and Panama. The **International Covenant on Economic, Social and Cultural Rights** is binding on all of the above and Honduras. Article 1 of both covenants states:

"All peoples have the right of self-determination. By virtue of that right they freely determine their political status and freely pursue their economic, social and cultural development.

"All peoples may for their own ends, freely dispose of their natural wealth and resources . . . . In no case may a people be deprived of its own means of subsistence.

"The States Parties to the present Covenant, including those having responsibility for the administration of Non-Self-Governing and Trust Territories, shall promote the realization of the right of self-determination . . . . "

Convention on Prevention and Punishment of the Crime of Genocide

The definition of genocide is limited to extreme violations. The concept of "ethnocide" has not been adopted as a formal legal term in any major human-rights instrument, but it has been used to describe cases in which a group, as a people, is being destroyed by policies or practices imposed by a national government, even though members of the group are not being killed.

Implementation

The right to self-determination has not been established for Indian peoples under international law. The international community has not decided whether Indian nations, tribes, and communities are "peoples" or a "minority group."

Domestic remedies must be exhausted before a human-rights complaint can be brought to an international organization, and access to Indian groups is further restricted by limitations on standing. The International Court of Justice in The Hague will not accept Indian complaints about human-rights violations. Only members of the United Nations can be parties, and countries must consent before the Court is permitted to hear a case brought against them.

United Nations 1235 Procedure (established in 1967 under Economic and Social Council Resolution 1235) permits an international Non-Governmental Organization to make complaints about situations which "appear to reveal a consistent pattern of gross and reliably attested violations of human-rights and fundamental freedoms." This forum may be used only by NGOs granted consultative status with the United Nations Economic and Social Council.

United Nations 1503 Procedure authorizes the UN Sub-Commission on Prevention of Discrimination and Protection of Minorities to investigate complaints. Complaints must be about massive violations of human-rights. All proceedings, including the final decision, are kept secret from the public and the plaintiff.

The **United Nations Educational, Scientific and Cultural Organization** (UNESCO) accepts complaints brought by individuals or groups related to the fields of education, science, culture and information. This encompasses the "right of minorities to enjoy their own culture . . . and the right of peoples to self-determination, including the right to pursue cultural development." The goal is to negotiate a settlement through closed meetings; however, the procedure is not as secret as the UN 1503 procedure.

The **Optional Protocol to the International Covenant on Civil and Political Rights** enables the Human Rights Committee to receive and consider communication from individuals claiming to be victims of violations of the rights specified in the Covenant. This avenue is available to countries that have ratified the "Optional Protocol" (Costa Rica, Nicaragua, Panama). Of importance to Indian groups is the "right of ethnic minorities to enjoy their own culture in community with other members of their group." The Human Rights Committee generally does not consider complaints unless they have been filed under one of the other international complaint procedures; however, the procedure is more open to the public than the 1503 procedure.

Organization of American States Charter

The OAS Charter requires that all member countries "respect the fundamental rights of the individual without distinction as to race, nationality, creed or sex." The OAS has two human-rights instruments, both of which have been ratified by Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama. (Belize is not a member of the OAS.) Neither instrument specifically mentions the rights of indigenous populations, but both establish clear international language stating that government policy must not discriminate for reasons of race, color, sex, language, religion, political or other opinion, national or social origin, economic status, birth or any other social conditions.

The American Declaration of the Rights and Duties of Man adopted by the Ninth International Conference of American States, Bogotá, Colombia, identifies rights similar to those in the United States. The preamble states, "Inasmuch as spiritual development is the supreme end of human existence and the highest expression thereof . . . [and] . . . since culture is the highest social and historical expression of that spiritual development, it is the duty of

man to preserve, practice and foster culture by every means possible." Article XIII states, "Every person has the right to take part in the cultural life of the community."

The American Convention on Human Rights (also called the "Pact of San Jose," 1978) was signed at the Inter-American Specialized Conference on Human Rights, San Jose, Costa Rica, November 1969 and put in force July 1978. It is a formal inter-American treaty that strengthens and elaborates on the human-rights laws of the American Declaration requiring OAS countries to "achieve progressively" the economic, social and cultural rights which it declares. The Preamble recognizes "that the essential rights of man are not derived from one's being a national of a certain state, but are based upon attributes of the human personality and that they therefore justify international protection."

Implementation

Complaints are referred to the Inter-American Commission on Human Rights (IACHR) and to the Inter-American Court on Human Rights. The IACHR is the most convenient forum for Indians. Its reports are submitted to the OAS General Assembly and covered in the international press. The Commission acts as a mediator, not as a court; however, if a friendly settlement cannot be reached, the Commission may make its report public.

The OAS Inter-American Court on Human Rights was established in 1980. The IACHR may present cases involving countries that are parties to the Convention in the Inter-American Court in San Jose, Costa Rica. Indian peoples, however, may not directly present their own complaints.

To date the IACHR has not made a formal pronouncement on the land rights of indigenous populations, although Article 21 of the American Convention on Human Rights is broad enough to include the collective property rights of indigenous groups.

On November 18, 1989, the General Assembly on the OAS charged the IACHR with preparing a new juridical instrument on the rights of indigenous peoples of the Americas to be ready in 1992. The OAS development and approval of new international legal standards would parallel the work of the UN Working Group on Indigenous Populations. To date there has been only token involvement of Indians in the process, and a draft document is not available.

Other Sources of Policy

Explicit and implicit policies emerge from the activities of other organizations and interests.

International Labor Organization Convention 107, also called the Convention Concerning the Protection and Integration of Indigenous and Other Tribal and Semi-Tribal Populations in Independent Countries, is the only international convention specifically addressing Indian rights. Complaint procedures may not be used by individuals. ILO member countries are Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama.

The emphasis is on "integration" or assimilation. Article 11 states, "the right of ownership, collective or individual, of members of the populations concerned over the lands which these populations traditionally occupy shall be recognized." Article 12 states, "indigenous populations should not be removed from their habitual territories without their free consent, except under exceptional circumstances." Article 13 calls for "governments to recognize the traditional procedures of indigenous populations for the transmission of rights of ownership and use of lands, as well as to prevent persons who are not members of native groups from taking advantage of the native groups' customs or ignorance of national legal system in order to secure ownership or use of their lands."

ILO Convention 169 revises 107 with the intention of removing assimilative language. Article 1 adopts the term "peoples." Articles 6 and 7 establish the principle of consultation and participation in legislative or administrative measures, plans and programs for national and regional development that may affect indigenous groups directly. Articles 8-12 specify the relationship between indigenous and national legal systems. Articles 13-19 deal with land ownership, recognizing collective land rights, protecting the rights of ownership and possession, the right to natural resources, and rights in connection with removal and relocation of people.

Indigenous participants to the revision process have claimed that the document fails to recognize their world view. Two main concerns are the use of "consult" in place of "consent" and the qualification of "peoples" to not imply the rights attached to the term under international law.

"consent" and the qualification of "peoples" to not imply the rights attached to the term under international law.

The World Bank has established directives providing policy guidance to "ensure that indigenous people benefit from development projects, and avoid or mitigate potentially adverse effects on indigenous people caused by Bank-assisted activities." The Bank's Indigenous Peoples Development Plan lays out the prerequisites and steps required for a planning and development process based on the "informed participation of the indigenous people themselves."

CHANGING VALUES AND MORAL PERSUASION

KEY POINTS

- **Beliefs and values about "progress," "cultural diversity" and what constitutes "human-rights" drive policy and the legislation implementing it.**
- **New values that stress preservation of future options, resilience over efficiency, and the protection of cultural diversity are leading to policy guidelines for protecting indigenous rights to traditional lands and resources and for promoting the participation of indigenous peoples in the use and development of those areas.**

New statements of policy on the rights of indigenous peoples are gradually finding their way into national legislation and into the policy objectives of donor institutions such as the World Bank (United Nations 1991).

UN Working Group on Indigenous Populations

The Working Group on Indigenous Populations was established in 1982 under the UN Commission on Human Rights and its Sub-Commission on Prevention of Discrimination and Protection of Minorities. Its purpose is to "review developments pertaining to the promotion and protection of the human-rights and fundamental freedoms of indigenous populations and to give special attention to the evolution of standards concerning the rights of indigenous populations." Although the Working Group is not a judicial body and has no legal power to provide remedies, it is presently the most important international organization to which Indians are bringing general human-rights complaints.

The Working Group states in the 1991 Draft Universal Declaration on the Rights of Indigenous Peoples:

"Considering that all peoples contribute to the diversity and richness of civilizations and cultures, which constitute the common heritage of humankind [and] . . . believing that indigenous peoples have the right freely to determine their relationships with the States in which they live in a spirit of co-existence with other citizens . . . .

"Indigenous peoples have the right to self-determination in accordance with international law. By virtue of this right,

they freely determine their relationship with the States in which they live . . . . Indigenous peoples have the collective and individual right to be protected from cultural genocide . . . the right to maintain their distinctive and profound relationship with their lands, territories and resources, which include the total environment of the land, waters, air and sea, which they have traditionally occupied or otherwise used . . . the right to own, control and use the lands and territories they have traditionally occupied or otherwise used . . . the right to the full recognition of their own laws and customs, land tenure systems and institutions for the management of resources . . . the right to effective State measures to prevent any interference with or encroachment upon these rights . . . ."

The Working Group also enumerated for the first time the specific rights that are guaranteed by the right to self-determination:

"The right to participate fully at the State level, through representatives chosen by themselves, in decision-making about and implementation of all national and international matters which may affect their rights, life and destiny . . . . The States have the duty to guarantee the full exercise of these rights, [and] . . . the individual and collective right to access to and prompt decision by mutually acceptable and fair procedures for resolving conflicts or disputes . . . ."

The Draft is scheduled for revision during the 1992 session of the Working Group and will be considered by the UN Economic and Social Council and by the General Assembly in 1993.

International Conference of NGOs, Indigenous Peoples and the Land

This 1981 conference established the relationship between land ownership and self-determination, including the right over natural resources contained in the soil and beneath the soil, and affirmed: "Indigenous peoples . . . have the right to live freely in their own territories . . . the tight relationship that indigenous peoples maintain with the land must be understood and recognized as the fundamental basis of their cultures, spiritual life, integrity as peoples, and their economic survival."

Inter-American Indian Congress

The Fifth Inter-American Indian Congress, Quito, Ecuador, 1964, stated, "In all development programs, the rights of aboriginal populations to the possession and free utilization of the lands that they occupy shall be respected . . . . The recognition of the right of forest-dwelling populations to land should be carried out through the concession and maintenance of reservations or inalienable land grants; and . . . the governments should create, maintain and amplify reserves or national forest parks occupied by forest-dwelling Indians."

The Eighth Inter-American Indian Congress, Merida, Yucatán, Mexico, 1980, stated, "The design and execution of national development plans should embody policies, systems and procedures that will guarantee the ownership and use of the land and of the natural resources that for centuries have belonged to the Indian peoples as one of the basic ways to guarantee their physical, economic and socio-cultural survival, as well as their access to national development within respect for the peoples' right to self-determination."

The Tenth Inter-American Indian Congress dealt with territorial rights of Indian populations and their consequences for human-rights.

Research Questions

What is the present level of fees and taxes associated with nature tourism? What is the relative relationship of supply and demand for this type of tourist activity?

Are earmarked taxes in place? What is the level of support for a specific park or park system?

What different management capabilities are required by the five categories of management objectives?

What are the trade-offs associated with the possible combination of public and private distribution of management responsibilities in these cases?

What are the impediments (political, economic, legal) to establishing, funding and managing cross-border parks? What incentives can international lending and development agencies create to make international cooperation beneficial to the parties?

Income generated from exploiting the natural resources in conservation units and buffer zones should be reinvested in developing sustainable production techniques and distributed equitably to community members. What mechanisms are currently available for channeling benefits to local communities? What new institutional mechanisms might accomplish this? How could they be implemented? (For example, the revenues from forest concessions might be invested in an international mutual fund that functioned as a community endowment fund. Interest would be used as a revolving fund, credit union, etc.)

What percentage should local people receive to compensate them for forgone uses so that the marginal benefits equal the marginal costs?

How can fee structures be established to serve various management objectives? What are their behavioral implications for various objectives, for example, supplementing regular government appropriation, or making the unit self-sufficient? What other policies need to be in place so that perverse incentives are not created?

How should fee structures take into account different groups?

What are some mechanisms for establishing communal ownership of traditional lands?

What national laws affect indigenous people directly and indirectly in their resource use patterns? What changes

would be required to guarantee tenurial rights both individually and collectively?

To date there is no treatment of customary law with respect to: (1) indigenous management systems over a range of resource types and economic contexts; (2) the impact of indigenous management systems on natural resource management practices; and (3) the "fit" of indigenous management systems with external policies, for example, forest management, parks, preserves, etc. What are the most important customary laws that guide behavior with respect to forest resources in the major groups under consideration?

The notion of *derecho consuetudinario,* or customary law, is more like English common law than the Roman law that gave rise to Latin American legal procedures. What structural and institutional conditions would have to exist to accommodate, link and interface these two kinds of law between the national system and the *comarca,* or autonomous homeland?

What are the range and nature of potentially useful protection techniques? What are the costs, limits, efficiency and effectiveness of these methods?

Involving indigenous groups (or local residents) in the management of conservation units (including appropriate development projects) will require new institutional mechanisms for: (1) linking state and local authorities; (2) developing new levels and types of enforcement authority; (3) resolving and mediating conflict; (4) collecting and dispersing revenue for local management needs; (5) sharing among community members the returns on longer-term investments; and (6) compensating community interests for the forgone benefits of conserving resources or using them at a slower rate. What models from other areas (policy, management, investment, insurance, etc.) can be adapted or modified? What lessons have been learned from current projects?

Indigenous economies utilize local resources for subsistence, barter and limited outside revenue. How can the use value represented in this economy be included in formal planning activities?

What is the impact of the various donor policies on the ability of indigenous groups in forested areas to control their resources and make self-determined decisions about their resources? How do those policies interact with the constellation of national laws and policies in terms of these issues?

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WILDLIFE PROTECTION AND TRADE

KEY POINTS

- **Both international treaties like CITES and national legislation protecting wildlife have been difficult to implement because of the high prices that wildlife command and rural poverty.**
- **Large shipments of wildlife have been limited as a result of treaties and legislation.**
- **Porous borders in Central America have allowed continuation of wildlife trade.**

International trade in wildlife has contributed significantly to the extinction of wildlife species of flora and fauna. There is great demand for some of these species, and the prices paid in developed countries so high that existing international and national wildlife protection laws are difficult to enforce.

Capture and trade in wildlife is one way for poor people to earn a living. Nevertheless, international treaties and supporting or complementary national legislation may have contributed to smaller-scale operations, even though capture of banned or restricted species occurs frequently.

LIKELY IMPACTS OF ENACTMENT OF AND ENFORCEMENT OF WILDLIFE PROTECTION LAWS:

Growth

- Short-term loss of trade-related income.
- Long-term potential for nature tourism.

Welfare

- Loss of a source of income for rural poor with potential for employment from tourism-related activities.

Conservation

- Preservation of wildlife and biodiversity.

INTERNATIONAL CONVENTIONS

The principal international treaty governing trade in wildlife is the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). In force since 1975 and currently ratified by 111 states, CITES establishes lists of endangered species for which international commercial trade is prohibited or regulated via permit systems.

Designated authorities in each country review and grant permits. Records of permits granted must be transmitted annually to the Convention Secretariat for review although many parties do not comply. The convention establishes three levels of restriction on wildlife trade:

1) For plants and animals whose world populations are clearly in danger of disappearing in the short-run (CITES Appendix 1), trade is prohibited.
2) For plants and animals whose populations are excessively threatened, even though they are in no immediate threat of extinction (CITES Appendix 2), trade is restricted.
3) For plants and animals whose local populations are threatened (CITES Appendix 3), trade is restricted.

The last two categories require the exporting country to certify the export to the importing country.

Information about endangered species is in some cases quite scarce. Many species have yet to be identified even though enough information exists to identify some species for inclusion in CITES Appendix 3.

EXPORT CONTROLS AND CROSS-BORDER ISSUES

Because trade in wildlife results from a combination of factors associated with high demand and associated high prices and extreme poverty in the rural areas of developing countries, enforcement of regulations is difficult and illegal trade is common.

Other international treaties also affect wildlife trade. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 1979), in force since 1983, obligates parties to protect endangered migratory species and establish international agreements to protect species that are not yet endangered. It prohibits trade of listed endangered species and encourages member states to conserve and restore habitat areas for migratory species. However, the 36 current signatories do not include several countries of major importance for migratory birds.

Some countries in Central America have laws, regulations or executive orders limiting or prohibiting trade in wildlife and/or endangered species. Because of the institutional weaknesses of the agencies given responsibility for enforcement of the law, most of these laws are widely ignored.

In some cases, those who have been caught in such trade have been dealt with harshly as an example to others involved in illegal wildlife trade. Some evidence exists that larger shipments of protected wildlife have been curtailed by customs officers. However, wildlife trade flows easily across the porous borders between Central American countries. In some cases, wildlife is captured in one country and transported to another where exportation is either allowed or easier. Other problems exist because of the difficulty in identification of prohibited flora. Customs officials lack the expertise needed to perform their enforcement responsibilities. When the trade is lucrative enough, corruption can occur at borders.

In addition, some species, such as green turtles, are migratory and face pressures in some parts of their habitat versus others. Some of the problems arise from hunting while other problems arise from habitat destruction.

Hunting Laws

Some countries have enacted hunting controls or bans as well as charging fees for sport hunting. These laws are largely ignored and the fees uncollected because the departments assigned to enforce these regulations are too weak to apply the laws.

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COASTAL ZONE MANAGEMENT

Coastal Protection and Development

KEY POINTS

- Government ownership of coastal areas is seldom effective in protecting the resource base.
- Private ownership fails to account for important environmental values of coastal resources.
- Many government and private organizations have overlapping and often conflicting interests and responsibilities for coastal areas, which has commonly resulted in poor overall management.
- Developments of mariculture and tourist activities have been facilitated by various fiscal and export incentives, but the direct and indirect environmental consequences of these activities have not been adequately considered.

LIKELY IMPACTS OF MARICULTURE DEVELOPMENT:

Growth

- Increased production, foreign exchange and government revenue.

Wealth

- Increased employment in mariculture but possible loss of employment in artisanal fishing and other mangrove-dependent activities.

Conservation

- Loss of biodiversity.

MANGROVE AND OTHER PROTECTED AREAS

Coastal zone management, like watershed management, is primarily focused on resource and institutional interdependencies. Many kinds of resource issues arise because of the variety of uses that are attached to the resource and associated with the location.

The policy issues involved include: (1) the private and public benefits of preservation of coastal areas, especially mangroves, regardless of the de jure ownership system; (2) the effectiveness of public ownership controls where that system exists; (3) controls on private ownership and development; and (4) the often complex and confusing and uncoordinated set of institutions responsible for coastal zone resource management.

Resource uses can include biological resources and wildlife habitat, mangrove tree use for charcoal and salt drying, and mariculture locations. Conflicts between users are common. Problems also exist when the coastal areas absorb pollutants from upstream urban, agricultural and mining activities. Mangroves are also destroyed to make room for urban and tourist developments.

Government de jure ownership of coastal resources is common throughout the Central American region. Belize, however, does have much of its coastal resources in private ownership. Public ownership is generally ineffective in controlling deleterious uses of mangroves. The nominal owner-

ship by the state creates an open-access resource where the incentives are to use the resource before others do so first. Legislation prohibiting or controlling use of coastal zone resources has been ineffective because the institutions charged with implementation are generally weak.

Where private ownership regimes hold, the value of the resources in terms of wildlife habitat and environmental maintenance will not determine their decisions about use. Even where governments attempt to regulate or control private uses, the ability of institutions is weak and the potential gains from alternate uses too great to effectively control behavior.

Finally, the physical, biological and socio-economic interdependence of coastal areas is reflected in all countries in the region by a large set of public and private actors with different interests and charges. In the public sector, many institutions have confusing, conflicting and/or time-consuming regulations, which hampers effective government action. Indeed, coastal zone management projects are frequently focused on establishing some institutional coordination across a wide variety of groups and institutions. This is another reason why they are problematic.

DEVELOPMENT POLICIES

Some of the institutional problems arise from efforts by the government to use the location and resource attributes to encourage various kinds of development projects. Two important types of coastal development are mariculture and tourism.

The potential benefits in terms of employment and foreign exchange have made mariculture development of great interest to both governments and foreign donors. The financial benefits, however, are unevenly distributed and, in some cases, favoritism is involved.

Shrimp farm development generally involves concessions from government agencies. There are frequently fiscal and export tax subsidies and incentives for shrimp farm developments. The environmental issues that arise from these concessions are the direct and indirect effects of the shrimp farms on mangroves. Shrimp farms can directly destroy mangroves as well as curtail the flow of water to mangroves. Also demand for post larvae shrimp from mangrove habitats can negatively affect the catch of other local fishery products.

While the economic importance of shrimp farms can be significant in the short term, there is debate about the long-term sustainability of shrimp farming given the history of such operations in other countries. Many of the largest operations are foreign-owned or involve significant foreign investment.

Tourist development is another activity supported by government policies. Taxes, import duties and infrastructure policies are used to encourage foreign as well as domestic investment in tourism developments.

Tourism developments commonly have negative environmental effects on the carrying capacity of the local resource system. In coastal areas, problems arise from urban wastes. In San Pedro, Belize, development-related problems include significant water shortages, pollution of the aquifer and salt water intrusion. No regulatory system effectively controlled the tourist development on the island. Many tourist activities, while generating jobs and foreign exchange, also present long-term environmental problems that will inhibit future economic conditions. Tourism activities can also produce conflicts with fishermen.

Fishery Regulations

KEY POINTS

- **Fisheries are generally open-access resources that require some limiting actions in order to prevent overfishing when demand for the resource increases.**
- **Government declarations of ownership and establishment of regulations and controls seldom function because of the lack of manpower in the institutions with enforcement responsibilities.**
- **Many fishery issues cross national boundaries, complicating solutions.**

LIKELY IMPACTS OF IMPROVED FISHERY MANAGEMENT:

Growth

- Short-term depletion of catches and production with long-term sustainable production.
- Increased cost of government regulatory activities.

Welfare

- Short-term loss of employment.
- Long-term certainty of employment.
- Increased food supplies in the long term.

Conservation

- Sustainable use of the resource and ecosystem.

Resource degradation is a common problem associated with fisheries. If the fishery is an open-access resource, fishermen have the incentive to overfish the resource. Governments, which have often declared nominal control over the fisheries of the country, attempt to correct this behavior through regulations and constraints on the behavior of fishermen. In Central America, these controls are seldom enforced because of the weakness of government institutions. However, some controls are easier to implement than others. Equipment controls, catch limits, season controls, mandated fishing methods and control of fishing areas are a few regulatory mechanisms that merit further evaluation. Fishing cooperatives are sometimes successful in enforcing discipline on the activities of their members.

Cross-boundary fisheries present even greater challenges for governments attempting to protect fishery resources.

Research Questions

What institutional structures control use of natural resources in coastal areas?

Are significant fiscal and export incentives in place to encourage activities which, while increasing foreign exchange, negatively impact the environment?

What minimum basic regulatory policies are needed to either control the open-access nature of some coastal resources or help ensure that private transactions take into account environmental values?

International fisheries are especially complicated to manage when national regulation is weak. What minimum regulations are needed to manage the resource for sustained use?

WATER POLICY AND WATERSHED MANAGEMENT

Water Control, Use, and Pricing

KEY POINTS

- Although water is generally considered to be the property of, or is controlled by, the state, weak and conflicting government institutions are typically responsible for management of water resources.
- Water is often treated as an open-access resource and as such is not sustainably managed.
- Water user fees do not represent the value of the resource to the user, which results in inefficient water use. Additionally, the fee is seldom collected.
- Better water resource management will require improved coordination among a myriad of government institutions as well as analysis of the relative value of water in different uses when conflicting use issues arise.

LIKELY IMPACTS OF IMPROVED MANAGEMENT POLICIES FOR WATERSHEDS:

Growth

- Short-run reductions in production as resource-conserving behavior is adopted. This will result in long-term, sustainable growth.
- Greater revenue for governments and better funding for watershed management activities.

Welfare

- Long-term sustained production, increasing food and employment opportunities.
- Increased health from better overall management of water resources.

Conservation

- Less erosion and sedimentation.
- More efficient use of water.

WATER CONTROL AND USE

Water in Central America is often an open-access resource and is generally viewed as the property of the state. The ability to control water use and allocation between competing uses varies from country to country, but the management of water and watersheds has generally been ineffective. Watershed management is generally an attempt to coordinate the various conflicting interests in the use of water and the spillover effects from one use to another. Management has generally taken one of two forms: either local control by individuals and communities evolves to determine water use, or various government institutions have been assigned often-conflicting mandates associated with water use. Indeed, competition between government institutions is a common feature of watershed management problems through out the region. In part, this problem arises because the government is unable to manage the responsibility it has assumed as well as the extensive interdependencies between various water uses. With increases

in demand for water supplies, hydroelectric generation, and agriculture, combined with diminished supplies because of watershed deterioration and groundwater depletion, water use conflicts and water scarcity will certainly increase.

Policy solutions will need to account for the institutional conflicts between uses. This will require analysis of the relative value of water in different uses. It will also require examination of the water resource benefits of policies that affect the rate of deforestation and the types of agriculture in both upper and lower watersheds. As such watershed management, defined as the orderly and planned activity developed within a geographic area known as a watershed, has been developed as a concept. (Policies associated with pollution are analyzed in the section on the environmental management policies.)

Allocation issues are addressed here only in relation to attempts by government to control use by concessions and monitoring requirements. The structure of concessions will vary significantly, and details are at present unavailable. Nevertheless, information provided in the various country policy inventories suggests that the water concession systems are poorly managed and understaffed. Thus, there is no effective control of resource use. This may be creating local open-access resource management problems where the incentive of local users is to get as much of the resource as quickly as possible before others do so. This can be a special problem with groundwater since, even with nominally private ownership, control of the resource is difficult because of the open-access nature of many groundwater aquifers.

WATER PRICING

An issue closely associated with water concessions is the user fee system attached with water use. User fees are established by government capture resource interdependencies and through tax and subsidy systems compensate one group for the effects, both positive or negative, of the actions of others.

In the case of water user fees tied to water concessions, the theory argues that pricing of the water should reflect the value to the user and/or the allocation of the cost of providing the water. Cost allocation issues often confound analysis and determination of the price. Pricing that reflects the value of the resource in the production process will result in

more efficient use of the resource. Collection of water use fees and monitoring water use in Central America are difficult within the current state of the institutions so charged. Only where monitoring is easy, as is the case with some large banana companies, will the fee be paid. Therefore, the common situation is that the rate fee structure is low and the fees themselves are difficult to collect. These issues are further discussed in the section on irrigation provision and pricing policies that follows.

Water distribution fees are designed to be collected from water users for the purpose of providing watershed management. This fee could be used to fund activities to address off-site effects of water use or incentives for the adoption of conservation activities.

Irrigation and Provision Pricing Policies

KEY POINTS

- Irrigation has resulted in increased agricultural production and changes in the choice of agricultural crops.
- Irrigation can also result in waterlogging, salinization, sedimentation and associated negative effects from fertilizers on soils and water.
- Public-sector projects and policies often highly subsidize irrigation users. This results in wasteful use and high demand since users do not bear the costs in proportion to the value of the water.
- Water charges would increase efficiency and help to cover a greater portion of the costs of the system to the government.

LIKELY IMPACTS OF IMPROVED PRICING OF IRRIGATION WATER:

Growth

- More efficient production of commodities and greater overall production with increased availability for other uses.
- Increased government revenues.

Welfare

- Greater availability to other water users.
- Increased employment from a more efficient and expanded irrigation sector.

Conservation

- Less pressure on marginal lands.
- Fewer examples of environmental problems from irrigation since water use is more efficient.

Irrigation has resulted in dependable water supplies, which have allowed farmers to intensify production by shifting crops and adopting high-yield varieties that respond to fertilizer. The complementary nature of irrigation water and new crops responsive to fertilizers has increased the marginal returns to water and both private and public returns to irrigation-system investments. However, irrigation activities, both large and small, can result in waterlogging, salinization, and sedimentation. These results can, in the long run, reduce agricultural productivity both on and off site. Irrigation projects drawing from ground water present other problems associated with resource drawdown exceeding recharge and infiltration from fertilizers and pesticides.

Public-sector irrigation is heavily subsidized and has become an enormous fiscal drain in many countries. In most countries, revenues from public systems do not even cover their operating and maintenance costs, and fall short of returning the capital invested in them. Revenues are also small relative to the value of the irrigation water on the farm. The value of the water to farmers can greatly exceed its cost, which results in excess demand and nonprice rationing systems. Farmers usually want additional irrigation supplies since they pay little of the additional costs. Because most revenue systems do not impose charges based on the volume of water used, the marginal costs to farmers are close to zero if they can get more supplies (Repetto 1988, 10). Low charges for marginal water use also contribute to the cultivation of relatively low-value or water-intensive crops in irrigated areas as well as slow adoption of water-conserving technologies and practices.

Establishment of water charges to farmers based on the volume used will provide an incentive for more efficient use, which will reduce excessive seepage into aquifers, the risks of waterlogging, and the apparent need for additional large-scale and costly irrigation system expansions. However, irrigation agencies are not structured to support good management. Capital budgets are typically allocated from the national treasury, and project revenues are returned to the treasury. Financial management of irrigation investments is inadequate.

Where funds for operation and maintenance depend on collecting fees from irrigators, and are low relative to operation and management or capital requirements, a interactive process of declining performance and declining collection of charges results. Where funds are allocated from central rev-

enues and do not depend on farmers' contributions, irrigation agencies are less accountable to users for good performance. Poor operating and maintenance standards not only reduce agricultural benefits, but can increase water losses and damage to soils and aquifers. (Repetto 1988, 13).

There are also many off-site interdependencies between irrigation and downstream users as well as the interaction between surface and ground water use. Policy discussions have focused on the possibility of taxes and subsidies to account for the off-site effects of irrigation activities. However, given poor administration of the irrigation system, these approaches, whether they be for watershed management or coastal zone management activities, have little chance for near-term implementation.

Research Questions

What is the water ownership and control system? Is it effectively managed?

How sizable are the revenues and what form do they take?

Do water user fees reflect the marginal value of the water to the users?

What government and private institutions are involved with water use and management? Do their mandates conflict? Are any watershed management coordinating institutions in place? Are they effective?

What is the level of public and private involvement in irrigation?

Are irrigation systems charging for irrigation water? If so, does the charge reflect the value of the resource to the user?

Do the existing institutions have the ability to implement improved charges? What are the costs and benefits associated with implementation of higher irrigation fees?

Have water distribution fees been considered or implemented? What is the financial status of the government institution in charge of irrigation projects?

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ENVIRONMENTAL MANAGEMENT POLICIES

A large class of environmental problems results from the free disposal of wastes into the air, surface water, groundwater, or on the land. At early stages of development, it may be feasible to allow unregulated accumulation of waste emissions because the assimilative capacity of the environment exceeds the level of waste generation. As development progresses, the scale of waste generation grows correspondingly, however, disposal exceeds this assimilative capacity and environmental and health damages follow. This stage of development calls for the implementation of environmental management policies.

Policies can be directed at the source of the waste or at the environmental or human endpoint where the damage occurs. In the first case, environmental management focuses on limiting this free disposal, such as through policies that change the generation, emission, storage, treatment, and recycling of wastes. These policies may intervene directly in how activities are carried out through regulations or indirectly through policies that address the contributing factors. Examples of indirect policy intervention are pricing and taxation policies for raw material inputs.

Alternately, environmental management can focus on mitigating exposure once wastes get into the environment. Such policies are necessary because environmental capacity constraints are seldom acknowledged until after damages have already begun to manifest themselves. An example is environmental cleanup of uncontrolled hazardous waste sites. When remediation costs are high, insulating the environment or humans from contamination may be the next best alternative. This option is typically used when large-scale contamination occurs, such as at Love Canal, New York, and Times Beach, Missouri, where hazardous waste contamination eventually led to moving residents out of these areas.

DIRECT REGULATION

KEY POINTS

- **Technology-based standards may not be a cost effective means of pursuing water quality goals.**
- **Ambient standards accommodate the circumstances of a given location's water quality needs better than uniform, technology-based standards. They do not, however, provide adequate guidance on which point sources should be controlled when tolerances are exceeded.**
- **Standards that are customized to the environmental and economic circumstances of individual point sources may be the most efficient. But the high transaction costs for establishing such a system may put such an approach beyond the reach of governments with limited resources.**
- **Setting priorities for the most important point sources that can be controlled cost effectively could be the best starting point for improving water quality.**

Regulations to protect surface waters initially tend to target the effluent from a finite number of "point sources." Such end-of-the-pipe regulation is a common, but not cost effective, means of pursuing water quality goals, in part because it is implemented in many circumstances through uniform, technology-based standards. Such standards restrict emissions to the levels achievable under the "best available" or "best practicable" pollution control technology. In the case of municipal and industrial discharges, the inefficiency derives from failure to consider the levels of control needed to achieve a given level of quality in the receiving water body.

End-of-pipe standards that are customized to the discharger's circumstances can reduce the cost of pollution control without sacrificing environmental protection. This can be done through performance standards set on the basis of water quality needs in the receiving water body. This approach requires more complete monitoring of each point

approach requires more complete monitoring of each point source than is required under a technology-based approach, where visual inspection may be sufficient to ensure that the technology is operating properly.

Although ambient standards may also be uniform, they at least recognize that variations in local conditions can affect the capability of a water body to assimilate wastes. Consequently, the pollution control requirements can be set to correspond to the levels necessary to attain ambient conditions for individual locales. When ambient standards are exceeded, however, it is questionable whether government authorities are capable of identifying the responsible individual point sources. Uniform requirements have the advantage of relieving the authorities of having to prove that additional control efforts by individual polluters are necessary.

Focusing upon one environmental objective, such as water quality targets, may create other environmental problems since many pollution control technologies transform rather than destroy pollutants. For example, treating wastewater to reduce the concentration of a toxic substance is likely to generate sludges with higher concentrations of this toxic. Since these sludges must also be managed, a more integrated view of management must include more than the water quality problem alone.

Limited budgets limit government oversight capabilities and the degree to which regulations can be established and implemented for individual point sources. Consequently, authorities may rely on command-and-control approaches to regulatory standards based on technologies used in industrialized countries. For some developing countries, such standards are too ambitious and cannot be enforced.

EFFLUENT CHARGES

KEY POINTS

- **Effluent charges provide polluters with monetary signals that can lead to changes in wastewater disposal practices. Imposing charges rather than direct regulation allows polluters leeway to decide how to reduce their level of pollution.**
- **It is difficult to determine the level of effluent charge that will send the right monetary signal to result in achieving a water quality target.**
- **It is also difficult to set an administratively feasible charge that is not so high as to cause financial burden and not so low as to be disregarded.**
- **Rather than serve as the key element of a program to improve water quality, effluent charges may best be used initially to supplement a program of standards, but oriented more toward raising revenue for a water quality authority rather than as an incentive to change behavior.**

Environmental economics points to the existence of socially optimal levels of pollution. Assuming that the social damages (in terms of negative impacts on the environment and human health) can be estimated, imposing a tax equivalent to this damage on polluters (a Pigouvian tax) will internalize the environmental externality and give the polluter the ideal incentive to mitigate the damage.

Typically, polluters are given little financial incentive to change their wastewater disposal practices. It only takes an investment in conduits to the nearest water body for an industrial facility to dispose of its wastewater. Households have limited access to sewage infrastructure in terms of hookups or handling capacity. Municipal sewage systems, to the extent they exist, serve as a means of collecting domestic and other wastewaters that are eventually dumped untreated into surface water bodies. Even though these industrial, household and municipal practices can be tolerable on a small scale, given the environment's assimilative capacity, wastewater increases from urban and industrial growth have long exceeded such a scale.

In theory, a charge on wastewater effluent could be structured to provide an incentive for polluters to alter waste disposal practices. To set this charge optimally, a government authority needs to know a great deal of information: pollution emissions by point source, resulting concentrations of each pollutant in the environment, physical damages that derive from these increases in concentration, and the monetary value of this damage.

Given these requirements, it is not surprising that few countries have used such charges as the primary means to control wastewater effluent. Still, several countries have used effluent charges in order to raise revenues to provide wastewater treatment facilities, oversee water quality protection, and subsidize industrial investments in wastewater treatment.

Although aimed primarily toward revenue raising, these charges do provide incentives for polluters to change disposal practices even though they are poorly targeted and their effects tend to be small since charges are set low to lessen industry or household opposition. Effluent charges can be coupled with a system of standards and are analogous to fines if charges are triggered when standards are exceeded.

Using effluent charges exclusively in place of direct regulation is unlikely. Achieving specific environmental targets with behavioral instruments, such as an effluent charge, would require extensively monitoring effluent sources and the resulting water quality. Charges would have to be frequently adjusted to reflect changes in effluent discharges and environmental conditions in order to send the right behavioral signals to polluters.

SUBSIDIES AND TAX EXEMPTIONS

KEY POINTS

- **Subsidies redistribute the burden of pollution control from polluters to society.**
- **Although subsidies may facilitate the adoption of better pollution control by individual facilities, pollution control will not be accomplished at cost-minimizing levels.**
- **A special form of subsidy, tax exemptions, may benefit most the polluters who are in the best position to pay for pollution control themselves, i.e., the firms that are the most profitable.**

On their face, subsidies seem to fit developing-country circumstances better than direct regulation or effluent charges. Subsidies lower the financial burden that pollution control imposes and possibly encourage faster adoption of new technologies. Furthermore, subsidies have certain logic. For example, shouldn't the cost of retrofitting manufacturing facilities with end-of-pipe treatment be borne by the government since it is generally the public who will benefit from pollution control, not the polluter.

Subsidies, however, have been criticized on both economic and environmental grounds. Creating a system of subsidies using general government revenues may run counter to efforts to rationalize the role of government in many countries. Even supposing that subsidies are one of the best uses of limited government funds, unless conditions are adequately imposed on awarding subsidies, they will not provide correct incentives to minimize pollution control costs. The environmental argument against subsidies is that they may encourage expansion of the industry receiving them, which can actually increase the aggregate level of pollution.

Tax exemptions, a special form of subsidy, are intended to encourage investment in environmental protection by granting accelerated depreciation for the pollution control equipment needed to meet water quality objectives. Clearly, these tax incentives favor profitable firms, which may not be the class of polluters needing the greatest inducement to invest in pollution control. Polluters of marginal profitability may need greater support before they will choose voluntarily to invest in greater pollution control.

The experience with one large-scale subsidy program for public wastewater treatment facilities indicates that the high subsidy share in investment costs (30% to 75%) led to capital-intensive solutions with excess capacity. Since subsidy shares grew over time, wastewater treatment plant operators may have delayed investment. Economies of scale may make wastewater treatment unaffordable for smaller communities, which will not be able to build wastewater treatment plants without financial assistance.

CROSS-POLICY ANALYSIS: WATER QUALITY

Policies in other sectors generate pressures on water quality that can confound the effectiveness of even the best environmental protection policies. Industrial growth provides an obvious example. Although each source of industrial pollution can be controlled more stringently, increasing the number of sources will outstrip the gains made from better controls at each individual source.

Industrial policy can also affect the success or failure of water quality protection when it determines which production technologies will be promoted or will benefit from various subsidies and concessions. Although there is only limited evidence, manufacturers may migrate from industrialized countries to escape more stringent environmental regulations, and the industries that migrate tend to be more polluting.

Subsidies may come in the form of raw material pricing policies that are advantageous to industry but that result in inefficient allocation of these materials and lead to greater throughput, waste and greater pollution. Chemical and mineral feedstocks are two important raw material categories with important environmental implications. However, the conclusion also extends to water pricing policies for both industry and households. Adjusting water prices to reflect true costs could reduce the magnitude of wastewater generation.

A host of other policies indirectly determine the level of water quality. Population policies that encourage urban migration and growth, increase urban densities and therefore the size of populations at risk. Land use policies that encourage the concentration of industrial facilities heavily tax the ability of surface water bodies to assimilate wastes. Where hydropower is important for electricity generation, flow rates for inland rivers may be adjusted to meet energy needs, with possible negative implications for these rivers' assimilative capacity for either treated or untreated wastewater.

Short-term needs, such as economic growth targets, tend to drive the policy agenda while environmental consequences manifest themselves over the long run. This tendency toward short-term horizons works to the disadvantage of environmental matters until they become acute. The cost of addressing acute problems is often prohibitive, whereas the cost of prevention would have been feasible if instituted at the outset.

DIRECT REGULATION

KEY POINTS

- **Technical standards for stationary and mobile sources tend to be set nationally, but they can vary by region and source. Many standards are technology-forcing, potentially raising the costs of air pollution reduction.**
- **Ambient standards are typically uniform and set nationally, but implemented at the subnational level. Delegating regulatory authority to the local level increases the ability to adjust to local needs and therefore to keep overall protection costs down. Local authorities, however, may be inclined to compromise more with vested interests who oppose more stringent requirements.**
- **Many air pollution problems are extra-jurisdictional, meaning that local, regional and state authorities may not adequately address what are basically national problems.**
- **Putting less emphasis on restrictive command-and-control regulatory practices and more emphasis on flexible approaches such as market-based instruments can lower overall control costs.**

In many countries, air quality regulations have focused on major stationary sources of air pollution, especially electric power generation and industrial facilities. Only as automotive traffic has increased significantly have many countries begun to address air pollution from mobile sources.

Standards are set nationally and tend to be uniform, but they can be allowed to vary by region or, especially where agreements are negotiated, by point sources with individual polluters. The more that standards can be customized to local environmental and economic circumstances, the more cost effective air pollution regulations are likely to be. However, local environmental and public health considerations do not always provide a comprehensive basis for setting standards since many air pollution problems cross local, regional and state boundaries.

Technical standards take the form of emission limits for mobile and stationary sources, as well as reduction requirements for stationary sources. Existing sources tend to be treated more leniently than new sources; this protects existing polluters from higher costs (for equivalent control), but it discourages the adoption of technologies that may be more efficient.

The technical standards for automobiles typically imply a specific technology to control pollution, such as catalytic converters, or imply wholesale design changes, such as those necessitated by fuel efficiency standards. As currently structured, mobile source standards limit pollutant emissions per unit of travel. Although each car may pollute less, total air pollution continues to grow along with the number of cars.

In the case of air quality standards, common pollutants of concern are carbon monoxide, sulfur dioxide, nitrogen oxides, total suspended particulates, ozone (from emissions of volatile organic compounds and nitrogen oxides), and lead. When these standards are implemented by subnational governmental authorities, a greater degree of flexibility and accommodation to local environmental and economic conditions can be achieved than under a program administered at a national level. In areas that do not meet standards, radical restrictions have been established, such as a ban on the construction of new plants until their added emissions can be offset by reductions in existing plants in the same area. In some cases, radical steps have been taken at the national level, such as the dramatic restrictions on lead additives to gasoline.

Even though noncompliance with air quality standards provides the basis for national authorities to mandate more stringent steps, this does not guarantee action. Delays in addressing significant air pollution may persist in large, growing urban areas unless authorities at the regional, state or national level can apply sanctions. Withholding national funds tied to large construction projects in nonattainment areas has provided leverage in some instances.

Air pollution problems must be addressed in the context of other related environmental issues. For example scrubbers to reduce sulfur dioxide emissions also generate solid wastes that have to be disposed; as toxic air emissions are controlled to a greater degree, the retention of toxic wastes

formerly emitted to the air may instead contaminate surface waters in wastewater effluent.

Air pollution regulations are often perceived by regulated industries as imposing undue costs on their operations. In practice, industrialized countries have found that, in the aggregate, pollution control and abatement expenditures add only a small amount to total costs of production. The exception to this conclusion occurs with particularly "dirty" industries, such as arsenic smelting and steel production, where high capital expenditures were needed to bring very old facilities into line with current specifications. In developing countries, this trap can be avoided if capital investment takes advantage of new environmental protection opportunities.

Putting less emphasis on restrictive command-and-control regulatory practices and paying more attention to regulatory approaches that are more flexible (such as market-based regulatory instruments) can also lower the overall costs of air pollution control.

EMISSION CHARGES AND ENVIRONMENTAL TAXES/TAX DIFFERENTIALS

KEY POINTS

- **Emission charges offer a relatively simple means for influencing the behavior of polluters. In theory, they can be designed to accomplish target levels of pollution reduction while avoiding the inflexibility of direct regulation. In practice, their use has been oriented to revenue raising, with little emphasis on providing incentives to polluters.**
- **Other financial instruments can be used to change air polluting activities. General fuel taxes are a common but not a well-targeted means for achieving pollution reduction, except in cases of differentiated taxes, such as those for leaded and unleaded gas.**
- **Other taxes, such as vehicle taxes, can be structured to influence purchasing choices among cars with different pollution implications.**

Emission charges can be used to create incentives to reduce air pollution emissions and to provide a source of revenues, especially for environmental programs.

Some countries are considering substituting environmental charges of this type for other revenue sources (e.g., income taxes) in a revenue-neutral fashion. This would reorient taxation away from focusing on desirable commodities (labor) to undesirable by-products of economic activity (pollution). It may reduce the "excess burden" imposed on society by suboptimal taxation, as welfare economics points out. One early 1980s estimate showed that for the U.S., effluent charges on particulates and sulfur oxides would produce efficiency gains equivalent to about 30% of the revenue that these charges would generate.

Charges on emissions of air pollutants have been used only in a very few countries. Because the size of these charges is usually too small to have an incentive effect, they function primarily as a revenue source. In one program, now suspended, charges levied on sulfur dioxide emissions were used to compensate victims of illnesses related to these emissions. These charges were highest in the most-polluted regions.

A tax on fuel is a price incentive that government authorities can use where fossil fuel-based energy consumption is involved. This serves as an implicit environmental tax, although it is not very well targeted since it focuses on energy use rather than pollution generation. In some countries, gasoline taxes double the price to consumers.

Tax schemes that differentiate on the basis of potential environmental impact provide better role models. In several European countries, taxes differentiated for leaded and unleaded automobile fuel are used to encourage the use of unleaded gas. Also, a few countries apply differential vehicle taxes based upon characteristics of cars related to their air pollution. These tax differentials may be transitional instruments since direct regulations also exist.

Revenues from the emission charges can be used to provide a wide range of incentives. For example, Sweden is planning to institute a nitrogen oxide charge applied to emissions from large furnaces. The charge will be rebated to the facilities on the basis of differences in emissions per unit of electricity generated, thus rewarding more efficient electricity generators.

Despite the ease of implementing a charge-based system relative to a regulatory or a marketable permits approach, emission charges are used infrequently, and if so, primarily for revenue purposes. By keeping the charges low, authorities can create a reliable and relatively large source of revenues without stirring up meaningful opposition by the regulated community.

OTHER ECONOMIC INSTRUMENTS

KEY POINTS

- **Trading approaches offer regulatory authorities the opportunity to retain greater control over the final environmental outcome than emission charges do while still drawing upon the power of economic incentives to reduce costs of control.**
- **Despite these advantages, the number of trading schemes actually implemented has been limited. Policy uncertainty, high transaction costs and institutional resistance have seriously impeded air pollution emissions trading.**
- **More experience with this approach could reduce some of these impediments. The U.S. is about to implement a major emissions trading program that could open up new possibilities. (See page 146 for example of sulfur dioxide emissions allowance trading.)**

Economic instruments attempt to provide a signal to polluters, constraining their options enough so that they have an incentive to change behavior while at the same time leaving enough room to achieve the most cost-effective means for change. By raising the price of pollution disposal (via an emissions charge for pollution), the environmental agency induces polluters to find their own cost-minimizing amounts of pollution. By limiting the number of emission permits and allowing polluters to trade permits, the agency allows polluters to determine the price of pollution disposal.

In either case, it should be possible to reach a target level of pollution. However, the environmental agency is likely to prefer the marketable permit approach because it allows direct control over the quality of emissions.

A few quantity-based emissions trading approaches have been implemented. One, known as the "bubble" concept, allows a plant with several air pollution sources that would otherwise be subject to emissions limits to meet an overall aggregate limit, consistent with those limits. This provision gives the plant the flexibility to choose which sources to control and to what extent, as long as the aggregate requirement is met, and creates the possibility of saving costs relative to the source-by-source approach.

An extension of this approach allows emissions from new sources at a plant as long as emissions from other sources are reduced. Another trading approach, "offsets," allows trades between emissions from a new source and those from an existing source, even though the two sets of sources are not internal to the same plant; the two sources must, however, be in the same air quality nonattainment area. Finally, the "banking" approach allows firms to earn credits for controlling emissions more than is called for under required emissions limits.

Although these approaches are called market-based, the true market experience embodied in these approaches has been very limited. Most of the trades have been internal to plants with multiple sources. In this sense, these trading programs have been relatively small, but they nonetheless have generated notable cost savings. Also, it has been noted that policy uncertainty, high transaction costs and institutional resistance have seriously impeded air pollution emissions trading. Whether a major emissions trading scheme can have comparable success remains to be seen. (See page 146 for an example of sulfur dioxide emissions allowance trading being initiated in the United States.)

Experience with one other environmental trading program does provide insights into how well a market for newly created rights can develop. During the phasedown of lead in gasoline in the U.S., refiners were allowed to trade the restricted rights to lead additives in gasoline. By the end of the program, about 50% of all lead additives in gasoline was obtained through the trade of lead rights. This program was successful because it was mostly free of government intervention and because well-established markets in refinery inputs already existed so that refinery personnel began the lead trading process with considerable experience with similar transactions.

Trading approaches try to reduce the social and private costs of reducing pollution. They supplement rather than substitute for direct regulation and take environmental goals as given. Although they are economic instruments, it does not mean that they are used to achieve economically efficient outcomes. Setting the level of total emission reductions implicit in trading programs is the domain of decision-makers who may variously consider or ignore economic considerations.

CROSS-POLICY ANALYSIS: AIR QUALITY

Policies function in an interactive fashion, but those interdependencies are not usually directly addressed. Energy policy presents the most obvious policy linkage to air pollution issues. For example, programs to promote electrification increase the demand for electricity and the level of pollution coming from the power sector, but they can also reduce the reliance on other field sources (such as inefficient biomass burning) that may actually emit larger quantities of certain pollutants per unit of effective energy.

Concerns for energy security can dramatically affect the composition of primary energy sources. When energy security is oriented strongly toward preserving scarce foreign currency reserves by using low-quality domestic inputs (both in terms of energy content and waste output), it may be achieved at the cost of more efficient imported supplies. Energy conservation measures could accomplish the same security goals without increases in air pollution.

The effectiveness of innovative, market-based approaches can be limited by decisions made outside of the direct purview of environmental policy. For example, energy policy, especially when it is set at the subnational level, can affect the magnitude of cost savings from the trading of acid rain allowances. State utility commissions, through their regulations of rates of return for electric utilities, determine which capital gains and expenditures are allowed in calculating the rate base for utilities. In many circumstances, capital gains that appear to originate in their positions as monopoly suppliers are excluded. The market for acid rain allowances, however, operates in part by rewarding some utilities with capital gains and allowances they hold. Exacerbating this bias, pollution control equipment, which may not be cost effective, can be depreciated at an accelerated rate with utility commission approval. This tilts the pollution control choices of utilities towards capital-intensive and expensive solutions.

Regulation of mobile sources of air pollution attempt to redress the environmental problem, but it is transportation policy that sets the ground rules. Decisions about investments in road and highway construction determine traffic volumes and patterns that contribute substantially to the growth of urban air quality problems. Mass transit competes with these investments for scarce government resources which may alleviate congestion and mobile source pollution.

Land use policy will determine the pattern of pollution generation as well as the resulting environmental and public health damages. Heavy industries that are located in the midst of urban population concentrations create human health risks that could be avoided by concentrating these industries in their own district. Doing so, however, may exacerbate some pollution problems by taxing the capacity of the environment to assimilate wastes. Nonetheless, in some cases, congregating industrial facilities may also allow economies of scale in the provision of environmental services, such as co-generation of heat and electricity or wastewater treatment facilities. These examples show that policies in other sectors can have complicated and conflicting implications for the environment.

To limit unintended environmental impacts from policy decisions in other sectors, like energy and transportation, it is necessary to broaden the policy debate to include environmental matters explicitly. This process does not necessarily lead to finding "win-win" solutions, but improved solutions cannot be found without broadening the debate. In most circumstances there are likely to be trade-offs between environmental objectives and the objectives of other important sectors. Whether environmental gains can be achieved will depend on the strength of evidence showing social losses from environmental and public health damages.

CROSS-POLICY ANALYSIS: SULPHUR EMISSIONS

In 1993, the largest application of a market-based approach to environmental protection is scheduled to take effect. At that time, the trading of SO_2 emission allowances will begin. After more than two decades of trying to regulate these emissions through "command-and-control" approaches that set emissions standards for individual pollutant sources, the United States Environmental Protection Agency (EPA) is implementing a more flexible approach that will save costs while still reducing overall emissions.

The trading scheme derives from the latest U.S. initiative to tighten controls on pollution from fossil-fuel electric power generation, as called for in the 1990 Amendments to the Clean Air Act. This step will cap national emissions of SO_2 at 8.95 million tons per year by the year 2000. This figure is 10 million tons below 1980 levels.

Through the market-based allowance trading system, the utilities rather than a governing agency decide the most cost-effective way to comply with the acid rain requirements of the Clean Air Act. An allowance authorizes a power generation unit within a utility to emit one ton of SO_2 during or following a given year. At the end of each year, the utility must hold at least as many allowances as there were tons of SO_2 emitted from the unit.

The initial allocation of allowances will be calculated in part on the basis of each utility's average fossil fuel consumption in the period 1985-1987. Additional allowances will be made available to selected units in the three states most affected by SO_2 restrictions (Illinois, Indiana and Ohio) employing demand-side energy conservation measures, and for auctions and sales by EPA. First priority in sales will go to independent power producers. The total number of allowances nationwide will be limited to 8.95 million in the year 2000.

The allowances can be bought, sold, traded or banked for use in future years. In theory, anyone is entitled to buy, sell or trade allowances, including brokers, municipalities, environmental groups and private citizens. Utilities that are able to reduce their emissions relatively inexpensively can sell their surplus allowances to other utilities that otherwise would have to take more expensive steps to comply with the emission allowances they are allocated.

EPA estimates that the allowance trading program will produce cost savings of about 50% ($10 to $14 billion) above the conventional "command-and-control" approach.

Land Disposal

DIRECT REGULATION

KEY POINTS

- **Land disposal policies need two interlinked components: one to remediate past contamination and one to prevent future contamination.**
- **Management practices for hazardous wastes that seem appropriate at one point in time, can lead to substantial and serious contamination when conducted over many years. Waste regulations that grow in stringency over time could avoid this outcome.**
- **Stringent waste regulations provide incentives for minimizing wastes. Regulations, however, may leave too little leeway for waste generators to adopt waste minimizing practices.**
- **There are advantages and disadvantages to having different levels of government involved in waste regulation. The models for how to combine these levels are still evolving. Combining the accountability that comes from national government involvement with the flexibility that comes with local government implementation may avoid some problems encountered by other countries.**

Policies aimed at addressing contamination from the disposal of hazardous wastes on land have two interlinked components: one remedial and one preventive. In the last decade or so, a few industrialized countries have initiated large-scale efforts to clean up contamination resulting from past management practices and to implement policies to prevent future contamination. In developing countries, hazardous wastes present a growing problem because industrial wastes increase as manufacturing grows, and these countries are candidates for handling wastes exported from industrialized countries.

The sites that are the focus of remediation tend to be the most flagrant examples. Many of the practices that led to this contamination were considered acceptable at the time they took place. In some cases certain waste management

practices are tolerable on a small scale but are not if they are conducted for several years. In other instances, such as with concentrated PCB- or dioxin-tainted wastes, the disposal practices make no sense even on a small scale.

The new policies to prevent contamination tend to mandate very specific measures. In several countries, any facility managing hazardous wastes must be issued a permit that may include explicit technical requirements for the design and operation of each unit handling hazardous wastes. This approach is complicated because the waste stream is heterogeneous. It comes in solid and liquid forms, containing one or more of hundreds of chemical constituents. It can be managed many different ways: disposed in landfills and in surface impoundments, stored in containers, incinerated, injected in deep wells, treated, and recycled. It can be managed on-site, where the wastes are generated or off-site, and in some cases out of state and even out of country. Tracking wastes "from cradle to grave" with a manifest system has been used to try to prevent hazardous wastes from escaping regulation.

Stringent regulation of hazardous wastes, adopted in several countries over the past decade, encourages waste generators to find ways to minimize their wastes. Although direct regulations are not economic instruments per se, they do translate into higher costs, which waste generators would rather avoid.

Higher waste management costs can be avoided by capturing usable products in the waste stream, recycling and reusing inputs, and substituting inputs that generate less hazardous wastes. In some cases the waste regulations are so broad that they preclude important opportunities for waste minimization and recycling, the very things the regulatory program should encourage.

The disposal of municipal solid wastes in landfills has traditionally been the responsibility of local governments, even though county or state authorities have set the standards. Since municipal wastes were managed locally, this made sense. Municipal waste landfills, however, have been poorly managed, and federal standards in the U.S. now regulate the design and operation of municipal solid waste facilities.

This example illustrates the trade-off between the increased flexibility achieved from local responsibility for environmental management, and the need for ensuring con-

sistency (especially minimum levels of protectiveness) achieved from centralizing responsibility at the national level. Flexibility provided by local control may compromise environmental protection if certain vested interests prevail. Consistency provided by national control may be too heavy-handed, setting uniform standards that impose high costs.

Another example from the U.S. shows that the evolution of waste management regulations is far from complete. The U.S. Environmental Protection Agency has found that funding priorities are not in synchronization with priorities based upon risks. Programs to remedy hazardous waste contamination and to prevent future contamination were singled out as ones imposing relatively high costs for relatively small aggregate risks (even though there may be "hot spots" that present significant risks).

These funding priorities reflect at least partially the relative ranking that the public gives to environmental problems. The public is concerned about hazardous wastes, and these concerns have been translated into major programs. The task for the future is to realign these programs by eliminating poorly targeted regulations while still addressing well-identified sources of significant risks.

ECONOMIC INSTRUMENTS

KEY POINTS

- **Economic instruments are not used as significant alternatives to direct regulation of hazardous waste management. Rather, they are typically used to reinforce direct regulations or provide a source of public revenue.**

For an environmental problem that is predominantly addressed through proscriptive direct regulations, land disposal in some industrialized countries is addressed by a large number of economic instruments. Policies for the disposal of hazardous wastes in these countries feature one or more of the following:

Financial accountability. A requirement to show financial viability can be imposed in anticipation of potential liabilities from the operation of a hazardous waste facility. This financial test may not be very rigorous, especially when the facilities are subsidiaries of companies with large assets. The effectiveness of this requirement may be limited further by the fact that it may be difficult for injured parties to prove economic damages, thereby reducing the likelihood that the hazardous waste facility would actually be held financially accountable.

Fees. Waste generators face higher waste management costs the more stringent hazardous waste regulations are. In some cases, additional fees are imposed as a licensing or operations fee for the hazardous waste management facility, and fees can even vary with the degree of hazard of the waste handled. Unless such fees vary with quantities, they may provide only limited incentive to change hazardous waste generation and management practices. Fees per unit of waste do exist, but they may be too small to provide an economic incentive and primarily provide a source of public revenue.

There is at least one instance, in the U.S., where a hazardous waste fee has been designed like an import tariff and meant to curb wastes destined for disposal. One state, trying to stem the influx of wastes from other states, imposed a fee that varied with origin in attempt to reduce the economic gain that came from disposal within its borders

rather than in the state of origin. This fee was implemented explicitly because direct regulation of imported wastes (such as a ban) was prohibited by the U.S. Constitution.

For developing countries, prohibiting waste imports might be allowed under GATT, since there are provisions for countries to take the necessary steps to protect human health and resources. Plus, an international agreement on transboundary movements of hazardous wastes under discussion is intended to restrict waste imports where these may damage the environment.

Product charges. In the U.S., a tax on chemical feedstocks and petroleum was created to fund the cleanup of existing contamination from hazardous wastes. Too small to provide an incentive effect, the charge also suffers from a poor linkage to the problem of concern—improper management of hazardous wastes—although the taxed substances may eventually be improperly disposed. This tax effectively treats all uses of the taxed substances equally, regardless of their environmental implications. Attempts to replace this product charge with a waste end tax have failed.

Liability. In addition to the financial accountability that can be imposed on hazardous waste management facilities, all entities that generate, handle or transport hazardous wastes, and even banks that are substantially involved in the management of these entities, can be held liable for any past, present or future contamination, even if it arises in waste practices that were allowed at the time. This blanket liability has induced firms to clean up existing contamination, to make waste management practices more thorough and to reduce waste generation—all on a "voluntary" basis (i.e., without explicit regulatory requirements).

Whether much of an incentive actually derives from this liability is unclear. The evidence is more anecdotal than conclusive. Furthermore, it is possible that the threat of liability may cause excessive steps to be taken, especially in view of the U.S. experience that firms and municipalities are being held liable for the cleanup of contamination that, in several cases, does not pose significant risks.

Whether the cumulative effect of these various economic instruments adds up to much influence on hazardous waste generation, management and clean up is unclear, partly because each influences only a small portion of the problem and partly because these instruments coexist with large programs of direct regulation.

For consumer waste destined for land disposal, other economic instruments have been tried, but they generally are used only on a small scale. Deposit-refund systems for bottles, batteries and tires, for example, have been implemented in a few countries and are under consideration in others.

Research Questions

What is the best point of intervention?

Which level of government (national or local) should establish water quality and drinking water regulations? Which level should implement and enforce them? Which authority within a level of government should have responsibility for water quality protection?

Can priority water quality needs be established, especially in terms of location within the country?

What information is available that would allow an initial review of potential water quality improvement priorities, especially with regard to identifying point sources that can be controlled cost effectively?

Are there any charges for the disposal of domestic or industrial sewage? If so, who collects these charges?

What is the current financial basis for existing investment in and operation of public and private wastewater treatment? Are they funded from general revenues or bond sources?

In cases where little or no wastewater treatment exists, what institutions are best suited to establishing and administering a system of effluent charges?

To what extent are fines currently used to enforce any existing system of water quality standards?

Are there explicit or implicit subsidies for controlling wastewater discharges? How large are they? Are they directed at economic agents who otherwise would not invest in pollution control? Has the use of subsidies been rationalized? Do the subsidies come with conditions, or are they merely distributed until funds are depleted?

Are there tax exemptions or allowances to encourage wastewater treatment control? How large are they? Which polluters take advantage of the exemptions? Are these pol-

luters the ones whose behavior it is most important to change?

What institutional mechanisms exist for evaluating environmental impacts from potential policy decisions targeted primarily at other socioeconomic issues besides environmental management? What mechanisms exist for integrating environmental concerns into actual decision-making?

How can the linkages between economic, population and other important social policies and the environment be quantified in a way that can realistically support policy analysis? For example, should larger models be developed (such as, one that adapts pollution coefficients to economic input-output models to predict the pollution consequences of different output configurations), or should these linkages be examined on a case-by-case basis as important policies are considered?

What are the relative environmental and public health risks associated with water quality deficiencies? Can these be assessed in a common unit of measure, such as through monetary valuation?

What are the likely economic impacts from different levels of effluent charges? For households? For industry?

What behavioral responses can be expected from different levels of effluent charges? By households? By industry?

Can a subsidy scheme be effectively coupled with an effluent charge mechanism to provide adequate financing? What are the incentive effects for investing in wastewater generation and management?

How much is known about the relative seriousness of different air pollution problems? What additional research is needed to establish a relative ranking among air pollution problems so that regulatory priorities can be risk-based? Can these problems be assessed in a common unit of measure, such as through monetary valuation?

What are the behavioral responses by polluters to different levels of emission charges for alternative air pollutants? How reliable are they as a revenue source? What are the economic impacts from different levels of charges? What are the likely environmental impacts? What are the ideal uses of the revenues from these charges?

What range of pollution control options is appropriate for addressing air pollution problems in the country? How much can be learned from the experience of industrialized countries, such as the costs of controls and the array of technological alternatives? How much must be customized for the circumstances of the country?

How effective might a market-based approach be in a given country, in light of the state of market development and the adequacy of public and private institutions that would be called upon to implement such an approach? Are the transactions costs likely to be too high to warrant experimenting with a market-based approach? Is there adequate oversight and monitoring to ensure the approach is operating as anticipated?

What are the proximate causes of the most important air pollution problems? What policies are connected to these proximate causes? Can a screening analysis be constructed to identify a rough menu of alternatives to the current policies that meets current policy objectives but with less environmental damage? What additional information is needed to evaluate the feasibility of these alternatives, and what does it take to obtain this information?

How can developing countries avoid the pattern of mistakes that has characterized industrialized countries' approaches to hazardous waste regulation, i.e., to allow lax handling of wastes until very serious contamination makes expensive remediation a necessity?

Is it possible to have regulatory stringency and oversight grow as the scale of hazardous waste generation and management grows?

Would establishing better information on hazardous waste generation and management now put developing country governments in a better position to regulate more stringently as necessary? What kind of information would be collected and how?

Can economic instruments be made the centerpiece of a regulatory program, or are they best considered a (small?) complement to a system of direct regulations? Should economic instruments applied to activities related to land disposal of wastes be oriented primarily to providing economic incentives or to raising revenue?

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MACROECONOMIC POLICIES

Systematic study of the interactions between macroeconomic policies and natural resource and environmental outcomes is a relatively new area of inquiry. Accounting for use of resources and environmental effects in macroeconomic indicators of growth is also in an incipient stage of development. Unlike studies of the effects of structural adjustment programs on the poor, the conclusion about the net resource consequences of macroeconomic policies is not yet clear.

This section raises some of the issues related to how macroeconomic policies affect economic growth, welfare and natural resources and the environment. The discussion here attempts to disaggregate some of the highly interactive and interdependent macroeconomic policy mix. Much remains to be learned, but some issues are emerging and are suggestive of the policy changes that will be needed in order to move towards economic development and sustainable use of natural resources.

Monetary and Credit Policies

KEY POINTS

- Expansion of the money supply and inflation discourage long-term investments and encourage short-term trading activities that result in resource mining.
- High real interest rates discourage long-term investment and investment in resource conservation.
- Government intervention in credit markets distorts the operation of market forces in allocating credit funds. This can lower/increase investment depending on the sectors involved and attractive available alternatives.
- Subsidized credit encourages borrowing from credit agencies. At times, credit is provided at negative interest rates; thus, in the long run, subsidized credit has negative effects on the accumulation of funds (savings), especially if borrowed funds are not used in productive investments.
- Delinquencies drain and discourage availability of funds in banks and other credit markets. Large borrowers are often a significant share of the delinquencies.
- For price and trade reforms to have their full effects, financial institutions must provide credit that enables the rural smallholder to reap the benefits of enhanced export programs. Affordable loans are an essential subsidy supporting extensive farming methods.

LIKELY IMPACTS OF LESS GOVERNMENT INTERVENTION IN THE CREDIT MARKET:

Growth

- Greater capital for long-term investments and hence a long-term increase in economic activity.
- Decreased government financial costs associated with credit subsidies.

Welfare

- Increased employment.
- Increased food production as subsidies for livestock production are removed.

Conservation

- Less forest destruction from livestock activities.
- Fewer incursions into protected areas because of more intensive production on existing, currently underutilized, land.

MONETARY POLICIES

Money supply and interest rate issues may appear to be far removed and irrelevant to the decisions made by the users of natural resources. The connections are not well understood and seldom considered by governments and international organizations concerned with the macro-economic policies of developing countries. However, these and other macroeconomic policies discussed below have had commanding importance in resource issues.

The purpose of monetary policy is to maintain a balance between supply and demand for money in order to avoid inflation or stagnation. Money supply has an effect on the inflation rate, which determines the real interest rate. A high real interest rate discourages the long-term investments required for economic growth as well as those required for maintaining and improving the country's resource base and productive capacity.

A sound monetary policy is essential for the optimal performance of the economy. A contractionary policy decreases investment and the operational level of the economy, tending to lead to economic stagnation, high unemployment levels and worsening poverty. An expansionary policy affects price levels and, if not carefully managed, may result in unacceptably high rates of inflation. An inflationary environment increases the risks and the real interest rate, discouraging investments, especially long-term investments needed for proper conservation and improvement of the resource base.

While the monetary supply situation in some Central American countries has not been extreme, their economies have been relatively stagnant or have declined as reflected by the decrease in consumption relative to the increase in population. There has also been an increasing rate of unemployment and underemployment in both rural and urban areas. These features of the economy place pressures on resources, as people use open-access resources to supplement inadequate incomes.

CREDIT POLICIES

The development of any economic activity depends on the availability of financial resources for its execution and their cost, represented by interest rates. In this way, the use of credit influences the use and management of the natural resources by promoting and facilitating the development of new activities and the adoption of new technologies that can have positive or negative impacts on the natural resource base.

Interest rate and credit policy has often been highly controlled by government regulations. These controls can take the form of maximum lending and deposit rates. Other characteristics include lines of internal and external financing, agricultural credit at subsidized rates to generally wealthier farmers and favorable reserve requirements for agricultural and livestock portfolios.

In Honduras, the National Agricultural Development Bank (BANADESA) is the state bank that handles agricultural credit. The bank deals mainly with the agrarian reform cooperatives and small and medium-sized private farmers. This institution has a limited capacity to serve the agricultural sector due to the high arrears of its portfolio, high operating costs and lack of autonomy in its operations,

since it is expected to finance other semi-public institutions. The private Honduran banks are conservative and have limited participation in financing agriculture due to the high risk of those operations and the lack of confidence in the law that regulates rural collateral. Their clients are the commercial farmers and ranchers, and their participation has increased through use of the special rediscount funds of the Central Bank.

Collateral requirements tend to favor landowners and wealthy investors. Landless peasants and smallholders are basically cut off from the official banking system because they have no collateral. Peasants cannot accumulate capital to use as collateral because of poverty and lack of investment opportunities. Thus, a vicious cycle has developed. This "collateral syndrome" in credit markets suppresses the investment potential of smallholders and thereby accelerates resource use and environmental degradation.

In general, interest rate policies are aimed at promoting the development of the economy. However, interest rate and credit policy has constrained long-term credit for investment in developing permanent crops and improving the farm through activities like soil conservation. The large bulk of agricultural credit has financed short-term inputs which, while essential for production, in some cases have had deleterious environmental effects (for example, use of fertilizers and pesticides). While subsidized credit for agriculture has influenced crop selection, in the long term it has resulted in the inefficient use of inputs. The lack of access to credit lines by small producers has had an impact primarily in basic grains production and made some countries increasingly dependent on grain imports. The reactivation of the agricultural sector requires timely credit that would allow small producers to improve their productivity through the adaptation of appropriate technology.

Subsidized credit for livestock has promoted extensive ranching, with the resulting inefficient use of grazing land and its degradation. Subsidized credit for other crops is mainly used for export crops that use high proportions of pesticides and fertilizers to increase their productivity. This can decrease the natural capacity of the soil to regenerate, thus requiring ever higher amounts of fertilizers to maintain the level of productivity. Short-cycle export crops, such as melons and pineapples, require high levels of pesticides. The type and quantity of pesticides used are often controlled

so that the toxic residues in the fruit are within the limits allowed for imports into the United States. However, this is not the case with pesticide concentration in the soil, which can be cumulative. Pesticides also filter into the groundwater, where their presence can lead to irreversible or very long-term contamination (World Bank 1987).

Trade and Exchange Rate Policies

KEY POINTS

- Overvalued exchange rates have been biased against agriculture, which has increased rural unemployment and resulted in underinvestment in resource conservation and pressure on open-access resources. However, exchange rate reform may in the short-term increase pressure on the resource base by contributing to more intensive use of the soil or expansion into marginal lands.
- Resource-ameliorating policies must be considered before such reforms are undertaken in order to prevent unsustainable resource mining.
- Domestic protection trade policies have been highly protectionist of the industrial sector and biased against the agricultural sector.
- The overvaluation of domestic currencies is an implicit subsidy for imports and an implicit tax on exports. This contributes to skewed prices against the agricultural sector compared to other sectors.
- Devaluation may shift production in favor of export crops. Devaluation and elimination of other policies that have skewed relative prices against agriculture will probably affect farm-level prices, but the results are not necessarily guaranteed because of intermediation and market structure.
- While pesticide use may increase as a result of an increase in short-cycle, nontraditional export crops, the prices of pesticides should increase with the elimination of the implicit subsidy for exports. Such price increases may discourage pesticide use.
- The need to increase foreign exchange has led to policies that have encouraged inappropriate input use or mining of resources.
- Attempts to measure the effect on exports of exchange reform or other policies will require a case-by-case examination of the change in relative cropping patterns and the environmental effects of the export crops. Some changes in cropping patterns will have beneficial effects on the environment, while other changes will be harmful.

LIKELY IMPACTS OF EXCHANGE RATE REFORM:

Growth

- Increase in GNP in the short term.
- Increase in exports in the short term.
- Long-term decreases in production if resource activities are not sustainable.

Welfare

- Increase in employment in the short term.
- Increase in agricultural production in the short term.

Conservation

- Increased pressure on soil and forest resources in the short term.
- Greater pressure on open-access resources.

EXCHANGE RATE POLICIES

The exchange rate regimes in many countries have been represented by overvalued currencies during most of the past two decades. As such, the trade and exchange rate regimes implicitly subsidized and hence encouraged imports and implicitly taxed and hence reduced exports. In addition, the competitiveness of domestic products was reduced in international markets.

The primary effect of the overvalued currency has been to skew relative prices against agriculture in comparison to other sectors of the economy. This has resulted in reduced investments and savings in the agricultural sector. For both agriculture and forestry, the implicit tax may have at the margin reduced exploitation of the resource; however, it also reduces the incentive to invest in the maintenance of the underpriced resources. Reduced employment within these sectors would have also placed pressure on the resource base, especially open-access resources.

The floating of the exchange rate has the result of increasing both prices received by farmers and consumer prices. It should increase exports and decrease imports. It should also shift production in favor of export crops. Pesticide imports should decline, and their use should become more rational with respect to their actual cost. However, there could be increased pressures on the export of timber as well as soil resource mining without complementary or compensating policies. Increased foreign exchange may therefore be generated in part by increased depletion of the forest resource base. Furthermore, better returns to agriculture might continue extensive farming practices and expansion of the agricultural frontier since problems still remain with respect to land tenure and forest protection.

TARIFF AND TRADE POLICIES

The tariff structure used in various Central American countries has varied over time. At the same time, effective protection generally has been negative for agricultural goods. The tariffs have been highest for industrial goods, and lower rates have existed for raw materials for the domestic industry and for agriculture. In some cases, agricultural products are in an unprotected situation when compared to the local industrial sector. This disparity in protection between sectors has been reinforced because the importation of most industrial goods has been conducted at the unofficial exchange rate (parallel market), while agricultural goods have been imported at the official exchange rate.

These tariff policies were aimed at encouraging the development of the local industrial sector through import substitution. In practice, however, the privileges and overprotection resulted in lack of competitiveness, poor-quality products and higher costs. This, in addition to the waste of raw materials and inadequate toxic waste management, has made Central America's industrial sector one of the least competitive in international markets. In order to obtain foreign exchange, some of those products that can be exported are subsidized, and others have received fiscal incentives that almost offset the exchange rate distortions.

The tariff policy has had an antiagriculture and anti-export bias, diverting the resources to less competitive activities, with a resulting loss of economic efficiency and lower living standards. The rural population has been directly affected by the low prices of agricultural products and

the resulting lack of production incentives. Migration from rural areas to urban areas is increasing, creating more unemployment, and thus increasing overall poverty. The subsidized wheat imports (via tariff exemptions and the previously overvalued exchange rate) have adversely affected basic grains production, especially corn, increasing the dependency on food imports.

By applying very low import tariffs to agricultural products, the real prices on domestic crops are lowered, thus, discouraging national production while demanding an increase in yields in order to compete in the international market. Import tariffs, while discouraging the production of staples and increasing rural unemployment, also increase the pressure on the forest, since the *campesinos* cut fuelwood to increase their income and cut trees to clear more land, as the decreasing terms of trade have reduced the profitability per hectare of the land already cultivated. The environment also suffers the effect of an inefficient industrial sector that effectively has no environmental controls, since the industries do not take into consideration the damage that the toxic residues cause to the atmosphere, soil and water.

"Policy liberalization causes an expansion of the traded goods sector and, at the same [time], contraction of its home goods sector. Consequently, as efficiency prices begin to prevail in the domestic economy, resources are drawn into the traded goods sectors. But, it is the growth of these sectors that place increased demands on a country's exhaustible resources. Moreover, if the increased pressure on exhaustible resources is not addressed, then the supply response from the early stages of liberalization is not likely to be sustainable!" (Roe 1991) Indeed, Lutz (1990) concluded that higher international prices and less price instability would lead to economic benefits for developing countries, but the associated environmental effects would be negative.

EXPORT PROMOTION POLICIES

The objective of export promotion incentives is to ease the foreign exchange shortage and to compensate in part for the antiexport bias implicit in the trade and exchange policies. The export promotion laws in Central America have encouraged nontraditional exports such as melon, pineapple and shrimp. Export-oriented policies in some agriculturally dependent countries will marginalize poor farmers and add to natural resource degradation. The poor are usually the

hardest hit during the adjustment process; without targeted complementary programs, they are forced to turn to the resource base to replace their losses. Some desired complementary measures include improved infrastructure and financial systems to facilitate farm-to-market movement of agricultural commodities, and increased funding for research and extension services.

The export promotion laws have encouraged the development of short-cycle crops, such as melon and pineapple. The extensive use of fertilizers and agrochemicals that is required by these crops can eventually reduce soil fertility and contaminate water supplies. However, not all nontraditional export crops have these associated problems. Indeed, analysis must be done on a case-by-case basis. Export crops such as coffee are often superior environmentally to traditional crops such as maize. Central American countries have a substantial relative advantage in the production of high-quality coffee and should be able to expand production to make up for the loss of revenues in certain sectors. The efficiency in the production of bananas has improved substantially in recent years, and nontraditional exports have been growing at a very fast pace, as lower trade restrictions are removing the antiexport bias of the trade regime. However, major constraints to further market expansion include difficulties in expanding domestic and regional markets and the time required to develop new nontraditional exports.

Fiscal Management

KEY POINTS

- The fiscal deficit limits the ability of the government to provide the services needed to protect the environment and foster effective natural resource management.
- Government deficits cannot be financed with domestic credit without increasing inflation. Internal sources of deficit financing reduce the availability of credit for private-sector activities.
- Interest on foreign debt has been a primary factor in balance-of-payment deficits and is a source of pressure for increased exports to earn foreign exchange. The payment of interest on the foreign debt leads to a shortage in foreign exchange and overvaluation of the domestic currency. Under such circumstances, firms have difficulty importing the technology needed to improve efficiency and increase production.
- Current expenditures (for salaries and wages) have rapidly expanded at the expense of capital expenditures. This represents a reduction in government investments in infrastructure needed to support economic development. Cuts in capital expenditures result in lower productivity, food deficits, reduction of exportable commodities and a decline in foreign exchange earnings.
- Revenues from various resource management-related taxes and fees are inadequate. Such taxes and fees are poorly administered and do not capture the economic gains or rents that should accrue to the government.

LIKELY IMPACTS OF REDUCING GOVERNMENT DEBT:

Growth

- Short-term economic contraction.
- Lower inflation.
- Long-term increase in the availability of capital for investment.

Welfare

- Short-term increase in unemployment.
- Lower food prices.

Conservation

- Greater spontaneous colonization.

FISCAL DEFICITS

Fiscal policies as defined here include not only government receipts, expenditures and debts, but also efforts directed at increasing revenue through taxes or user fees. Fiscal deficits and imbalances in external accounts result in part from the policies discussed above, which favor cheap food, low agricultural prices with subsidies for agricultural inputs and direct involvement in production, importation and marketing.

High current public sector expenditures have been difficult to reduce. Efforts undertaken to date to reduce them have only slowed down the rate of their growth.

The main component of public expenditures (defined as current expenditures plus capital expenses, without including the internal debt amortization) is current expenditures. In the 1980s, current expenditures were a significant percentage of total expenditures because of the high cost of the military, education, health, park services, and salaries and wages in some countries. Capital expenditures have gradually declined as a percentage of total public expenditures. At the same time, due to the generally high investment rate

in the 1970s and early 1980s in some countries, the annual amortization of the internal debt has increased substantially.

A general scenario is as follows. The reduction in public capital expenditures came as a response to the economic conditions, which made it necessary to confront serious problems in the balance of payments and large fiscal deficits. The decision to reduce capital expenditures was forced by the rigidity of current account expenditures, which in turn arose from pressures from labor unions and the perceived need for governments to create more employment for political reasons. In this kind of situation, the least controversial expenditure is cut, even though that action damages the country's productive capacity.

The allocation of public expenditures is relevant to the overall functioning of a country's economy, since the construction and maintenance of infrastructure (e.g., roads, electricity networks, ports) depend on those allocations to give adequate support to the production activities. The level of public expenditures also affects the government's ability to address its resource management responsibilities.

The fiscal deficit reduces the economic activity of the private sector and/or increases inflation, unemployment and poverty and, consequently, the pressure on the hillsides and forests. The population with the lowest income is forced to seek alternatives for its subsistence, which often means turning to the forests for farm land to grow food and for fuelwood that will bring some income to satisfy basic needs.

Inflation tends to rise in the presence of large fiscal deficits particularly where governments resort to printing more money to cover the deficits. This can be exacerbated by reductions in external sources of funding. There are no easy solutions to lower deficits. In attempts to bring down the deficit, the government might resort to cutting essential programs, including agricultural and environmental programs.

DEBT FINANCING

Deficits are financed from both external and domestic funds. The fiscal deficit cannot be financed with domestic credit without increasing inflation. Domestic deficit financing must use resources from the commercial banking system or the Central Bank, thereby increasing the money supply and the pressure on prices. Excessive borrowing by

the government might crowd out other investments. In particular, financing fiscal deficits with internal resources decreases the availability of resources for the private sector, thus slowing activities in that sector. The resulting decrease in investments for long-term improvements such as irrigation, drainage and soil conservation affects the productive capacity in the country.

Fiscal deficits are also financed by external borrowing from institutions such as the World Bank and the International Monetary Fund, through bilateral agreements between governments, and by private institutions. The interest on the external debt has been a determining factor in the balance-of-payments deficits in some countries, since it absorbs substantial portions of the export earnings. As a source of financing for investments, the external debt is a key factor determining the behavior of the economy, especially in Central American countries, which have little domestic savings capacity. Both the public and private sectors, and all branches of the economy, are involved in foreign borrowing.

The external debt may have positive or negative effects on the economy, depending on its size and how it is used. If used in an efficient and adequate manner, it can generate beneficial effects for the whole population. Inappropriate use of the external debt, however, can bring the economy almost to a full stop by limiting the net availability of foreign exchange for imports. This is especially true when the industrial sector depends heavily on imported inputs. A decrease in the net availability of foreign exchange thus means a direct loss of production.

A high level of external debt and the interest on the debt reduce the possibility of acquiring more funds for use in development programs. The government's investment capacity is thus limited by the need to earmark a certain percentage of the GDP to pay the interest on the external debt. The payment of this interest has been one of the determining factors in the foreign exchange shortage in recent years and, consequently, of the overvaluation of domestic currencies.

The external debt burden reduces the government's possibilities for investment, forcing it to cut back its programs for conservation, especially if these programs are linked to the granting of loans or subsidies. It also reduces agricultural growth overall because of the lack of investment in marketing and production infrastructure. The costs are

thus increased, promoting the overexploitation of the soil in order to obtain maximum yields. The decrease in investment also results in an increase in unemployment, rural and urban poverty and in increased pressure on the forests. When the government's expenditures are limited, the portion of those expenditures destined for forestry control and monitoring is reduced, resulting in more depletion of the forest resource through inefficient use. Some problems may also develop when industries are unable to import technology that would increase the efficiency of their operations.

DEBT-FOR-NATURE SWAPS

One response to this situation is debt swaps. Debt swaps are aimed at reducing the effects of debt burdens on LDCs. Three common programs are: debt-equity, debt-nature, and debt-debt swaps. The debt-for-nature swap involve the purchase of a country's debt at a discounted value in the secondary debt market, and canceling the debt in return for environment-related action in the debtor nation. Debt-for-equity swaps can be used to reduce external debt and also provide priority projects for the country. There has been relatively little activity on this issue in some countries. Such transactions would provide support to natural resource protection activities while reducing debt related pressures. Debt-debt swaps amount to transactions between creditors who interchange foreign loans.

There are at least four different variations of debt-for-nature swaps that have been proposed:

- donation of debt to a local environmental organization for investment in environmental projects,
- official debt relief tied to supporting environmental management,
- conversion of debt by the central bank into local currency or local debt (bonds) to be held by a local environmental organization for investment in environmental projects, and
- purchase of debt by an environmental organization and discounted sale to a multinational corporation to support environmentally sound corporate investments.

Research Questions

Who are the beneficiaries of existing credit subsidies? If subsidies were eliminated, how would agricultural production change?

What are the nominal and real interest rates? What other policies should be addressed if interest rate reforms are established?

Liberalization of trade will have many potential effects on both the rural and the urban environment. As with exchange rate reform, there are likely to be some significant negative effects. What will be the most severe negative effects? Does the government have the ability to regulate or control negative effects?

How has the need to increase foreign exchange influenced the policy mix within a country? Who benefits and who loses from such activities? What are the environmental tradeoffs?

Export promotion of both traditional and nontraditional crops has many different effects on types of employment generated and the resource consequences of their cultivation. Some require more pesticides. Others reduce erosion compared to domestic food crops while also increasing income and employment in rural areas. What are the environmental effects of the current crop mix, and what environmental effects should be expected from policy changes promoting exports? Are there ameliorative policies that can be established with limited requirements for government regulation or enforcement?

Does pesticide enforcement at the U.S. border constitute sufficient control of banned pesticides?

Reduction of fiscal deficits can in the long-term increase the ability of the government to support both development and conservation. Does the existing fiscal situation present long-term resource management obstacles that inhibit both investment and conservation?

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POPULATION

KEY POINTS

- Population multiplies the cumulative impact of a complex set of poorly understood relationships among policy, human behavior and natural processes.
- Population policies buy time to develop solutions to the immediate causes of resource degradation. These causes are very resistant to change and require a capacity to manage information and coordinate behavior that exceeds present institutional abilities.
- A population policy that is successful in reducing growth rates will have little immediate impact on reducing stress on natural resources.
- Policy formulation in all sectors must take into account the impact of demographic trends.
- For any given amount of resources, a slower rate of population growth would help to promote economic and social development
- The poor are most likely to be penalized by rapid population growth.
- The demand for family planning information and fertility regulation services will increase dramatically during the next decade. Present estimates indicate that resources from donors and host countries will be inadequate to meet this demand.

LIKELY IMPACTS OF REDUCING THE RATE OF POPULATION GROWTH:

Growth

- GNP may grow less rapidly, if increases in efficiency from technical innovation and economies of scale are not realized.
- GNP will grow more rapidly, if productivity increases are realized from greater per capita investments of capital.
- Rates of real net growth that correct for draw-down of the resource base and the costs of pollution and waste disposal will increase.

Welfare

- Reduced income inequality.
- Increased per capita household income and savings.
- Less congestion of employment markets and government services.

Conservation

- Decreased rate of draw-down of natural resources including waste disposal.
- Increased likelihood for long-term preservation of representative ecosystems and conservation of more biological diversity.

Declining mortality and high birth rates caused rapid population growth during the first two decades following World War II.

Economic policies biased against agriculture, archaic land tenure and policies promoting import substitution resulted in rapid urbanization and reduced the ability of rural areas to absorb increased population. This led to the congestion of employment markets and government services and to the displacement of agriculture into marginal lands.

Growth rates began to slow in the mid-1960s as modern contraceptive methods became available through family planning programs. Increased use of contraception accounts for 76% of the decline in population growth rates (Merrick 1986).

In 1990, the population of Central America (excluding Mexico) was 29 million, with an average growth rate of 2.55% per year and an average doubling time of 25 years (Merrick 1986). It will take an additional 25 years for the population to stabilize after replacement fertility rate is reached (Tietenberg 1988). Because 40% of the population is under 15 years old, their fertility will determine population growth rates in the next several decades. Table 1 summarizes major trends (Population Reference Bureau 1991).

The demand for family planning services will increase dramatically in the next 20 years as this cohort of females enters reproductive age. The costs of meeting this increased demand, assuming decreasing costs accompanying economies of scale, will be about $15 per user per year (Destler, et al. 1990, 10).

Population issues (growth rates, age structure, size, distribution and migration) influence and are influenced interactively by all other policy areas. Solid empirical work is limited and based largely on global aggregate statistical measures. There is little consensus on the exact causal links among population and other policy variables (United Nations 1991).

Population is the multiplier for the cumulative impact of a host of poorly understood relationships among policy, human behavior and natural processes. This means that the per capita benefits of any policy intervention anywhere that "improves" the situation by 20% will be equalized in less than 10 years due to Central America's 2.55 % per year average population growth rate. A 1% improvement will be equalized in less than six months (United Nations 1991).

Policy intervention to slow growth rates has occurred in other parts of the world. Certain conditions seem to promote policy intervention:

- Lack of access to medical care means that birth control techniques that are attached to health care delivery services are not available to all who want them.
- Reducing poverty and income inequality are considered public goods and can be alleviated through smaller families achieved by family planning information and services
- Government services become congested with rapid urbanization driven by high population growth rates. As landholdings become smaller and increases in yields fail to offset declines in size, small farms no longer provide a

TABLE 1.
MAJOR STATISTICAL TRENDS

	PAN	COS	NIC	HON	EI S	GUA	BEL
DEMOGRAPHIC STATISTICS							
% Change in total fertility 1970–87	-40.1	-32.7	-19.7	-22.0	-24.3	-21.0	-20.8
Rate of natural increase	2.1	2.4	3.4	3.1	2.7	3.0	3.1
Total fertility rate	3.0	3.3	5.5	5.3	4.4	5.3	5.0
Doubling time (yrs.)	33	29	20	22	26	23	22
% Population below 15 years	36	36	47	46	45	46	44
WELFARE MEASURES							
GNP/capita 1988; 89 (US $)	1,780	1,790	830	900	950	920	1,460
%Mortality rate—children <5 yr	3.4	2.2	9.5	10.7	8.4	9.9	—
%Literate women over 15	88	93	—	58	69	47	—
Legal age for marriage—female	16	15	14	12	14	14	—
Legal age for marriage—male	18	15	15	14	16	16	—
CONTRACEPTIVE USE							
%Married women using:							
• Any method	58.2	69.5	27.2	35	47.3	23.2	—
• Traditional methods	4.0	11.3	4.4	4.6	2.8	4.1	—
• Modern methods	54.2	58.2	22.8	30.4	44.5	19.1	—
% Voluntary Sterilization—female	32.0	13.9	7.1	12.1	31.8	10.1	—
% Voluntary sterilization—male	0.4	0.5	0.1	0.2	0.7	0.9	—
ASSESSMENT (0–10; 0 is lowest)*							
Availability of oral contraceptives	10	10	9	8	9	3	—
Availability of IUD	10	8	1	5	4	3	—
Availability of sterilization—female	10	3	4	3	10	10	—
Availability of sterilization—male	8	2	1	3	10	10	—
Availability of other methods	10	10	3	8	8	3	—
Availability of abortion	10	1	1	2	5	1	—
Service-related activities	5	3	3	1	8	4	—
Information and outreach	2	2	1	2	6	1	—
Private-sector involvement	6	4	2	5	5	3	—

*Source: Population Reference Bureau Options Database, June 1991

subsistence income for families, and males supplement income by working elsewhere.

- Common- or joint-access resources are being irreparably degraded through overuse and exclusive use rights cannot be assigned and/or enforced.
- For renewable resources with poorly defined property rights, the risk of excessive use and permanent degradation is high with rapidly growing populations. This is particularly true for forested lands and is aggravated by an unequal distribution of landholdings. While land reform is an option, it is difficult to implement. When population increases occur rapidly, demographically induced intensification has not produced sufficient increments in foodstuffs to feed the growing populations, and poor farmers adopt short-term strategies (cultivation of marginal lands, reducing fallowing rate).

Population growth affects economic growth in two ways (Birdsall, et al. 1984):

Savings per person. Corporate and government savings are not systematically related to population growth rates, but household savings appear to be reduced by high dependency burdens, especially among the poor.

Capital invested per person. The relationship between capital invested per person and per capita income is probably nonlinear because of economies of scale and efficiency gains achieved through innovation. The amount of capital invested per person, especially human capital (health, education and training) must be maintained in order to maintain constant income. As population grows, available capital is spread over more people. A slower growth rate allows increased capital investment per person, leading to increased per capita productivity and income. For income to rise, investment must grow faster than the labor force.

Mini-case

If fertility remains the same in Central America, the budget for education must double in 25 years to maintain the same level of coverage and quality. To increase the enrollment rate and/or standards, governments will have to:

- *generate more national savings;*
- *curtail investments in other sectors;*
- *spread spending over a larger group of children; and*
- *exclude a growing number of children.*

As long as an additional person's marginal product is positive, it will contribute to total economic output. Population growth increases average welfare only when the marginal product of an additional person is greater than the average product. Given sufficient resources (including waste assimilation capabilities), population growth creates additional wealth and drives development processes.

Focusing attention on the positive marginal product of population growth ignores its impact on the average person, i.e., the distributional and equity issues.

High population growth results in greater income inequality when it lowers per capita savings and capital stock accumulation leading to lower productivity per worker. It directly reduces the quality of the labor force when it lowers the per capita amounts of family and public resources available for long-term investments in human and natural capital, thus slowing the growth in wages of unskilled workers relative to skilled labor and wealth holders.

When the rate of population growth equals or surpasses economic performance (including the normally uncounted costs, such as draw-down of the resource base, pollution, soil degradation, etc.), additional people reduce per capita income and welfare, and environmental degradation and increased poverty and income inequality result.

The population policy debate revolves around three major viewpoints. Each one relies on a different set of assumptions and beliefs leading to different policy guidelines. These are summarized in the following three views (Birdsall 1989; Ridker 1992; Shaw 1989; King and Kelley 1985).

VIEW 1: POPULATION GROWTH IS THE CAUSE OF ENVIRONMENTAL DETERIORATION

The problem

- Rapid population growth combined with growth in income per person puts pressure on a fixed supply of natural resources causing prices to rise.
- The winners are those who own resources and their close substitutes. When resources are vital or close substitutes are limited, most people will be made worse off by population growth, especially the poor.
- Diminishing returns eventually set in as each person has a smaller share, and quality of life declines.
- Technical innovation will not be sufficient to compensate for diminishing returns from limited resources.

Assumptions

- An increase in the labor force relative to the supply of land and capital causes wages to fall and rents and profits to rise. This leads to concentration of wealth with property owners and less equal distribution of income.
- The savings rate will not keep pace with the increased population growth rate, causing capital to grow at a slower per capita rate and investment as a proportion of total output to decline.
- The higher proportion of young people require an increasing proportion of investment to be devoted to health education and infrastructure.
- Mitigating forces (price changes, substitution, recycling and innovation) will not offset increasing scarcity, and depletion of natural resources will limit economic development.

Beliefs

- Man is part of a finite and interdependent biosystem.
- The increasing scale of the human economy can cause irreversible changes in the capacity of the biosphere to provide life support services,
- Productivity gains from increasing efficiency, innovation, recycling and substitution are limited in the face of rapid population growth.
- The likelihood is small that we can develop backstop technologies and manage or control their consequences.
- Market prices will not allocate resources with respect to the carrying capacity of the biosphere and sustainable scale.

Policy guidelines

- The social cost of individual fertility choices is most important in terms of the long-term consequences for broad measures of per capita welfare.
- The most efficient point of intervention is with individuals and their fertility choices.

VIEW 2:
POPULATION GROWTH IS THE CONSEQUENCE OF POLICY FAILURE

The problem

- The immediate cause of population growth is policy failure.
- The problem is unrealized potential, not diminishing returns.
- As resources become scarce, their prices rise stimulating technical innovation and the search for substitutes.
- Population growth is conducive to development and economic growth by providing the stimulus for innovation.

Assumptions

- Agricultural production can be sustainably increased; land availability is not the constraint. It is poor management and lack of incentives and mechanisms for generating investment.
- Environmental degradation and disasters are largely the result of inappropriate policies.
- There is no evidence to substantiate the impact of demographic change on the share of government spending and little historical correlation between population growth and growth of per capita income.
- The long-run trend in the price of raw materials is downward due to technological progress; elasticities of substitution in consumption and production are high.
- The institutional and information-handling capabilities required to develop and implement appropriate corrective policies can and will be developed.
- The market's inability to disaggregate and price the natural resources that provide environmental services can be solved by policy intervention.
- The fact that prices guide market adjustments only when resources can be owned exclusively and bought and sold in the market can be solved by assigning property rights.

Beliefs

- There are no intrinsic limits to man's ingenuity and ability to manage natural processes.
- Growth is progress. We will develop backstop technologies and be able to control their consequences.
- Mitigating forces such as price changes, substitution, recycling and technical innovation will offset increasing scarcity and depletion of natural resources.
- The likelihood of irreversible catastrophic changes in the capacity of the biosphere to provide long-term life support services is not significant.

Policy guidelines

- Aggregate measures, especially of economic growth, are what is important, not its distributional consequences for individuals or localities.
- Economic growth and development are the best contraceptives.

- Government should not target individual decisions about fertility except to provide education and possibly contraceptive supplies.
- Given limited resources, it is counterproductive to allocate resources to family planning programs rather than to social development.

VIEW 3:

POPULATION GROWTH IS BOTH THE CAUSE AND CONSEQUENCE OF POLICY FAILURE

The problem

- Population change is the result of individual decisions made at the micro level in response to a wide range of signals provided by the larger system.
- Population change is one of the components of "vicious" and "virtuous" cycles in which policy intervention is possible at any number of points, each having a different set of winners and losers.

Assumptions

- View 2 may be correct in the long run, but the short-term consequences of population growth will limit or preclude long-term policy corrections that can lead to sustainable development.
- Development efforts are slowed by rapid population growth, which in turn depletes natural resources and further limits economic development.
- A finite and interdependent biosystem imposes limits to growth and to scale.
- Technical innovation leading to efficiency gains, recycling and substitution can extend those limits, but not forever.

Beliefs

- The short-term consequences for individuals and local communities are the most important.
- The distributional consequences for individuals, especially women and children, override efficiency considerations.
- Population policy as an essential stop-gap measure until population growth slows as a response to increased welfare brought about through policy reform.
- It is unlikely that wide-ranging policy reform can be implemented in the time frame needed.
- Fertility regulation and child spacing are human rights.

Policy guidelines

- The issue is where to intervene in a series of interconnected "vicious cycles" to turn them into "virtuous" cycles.
- Socio-economic development and family planning programs are mutually reinforcing.
- Buying time is an essential strategy.

Government Support

[The discussion of policy tools in this section and the mini-cases are drawn from studies by Harriet Destler, et al. (1990) and Stephen L. Isaacs, et al. (1991).]

In the absence of government support for slowing population growth, access to family planning information and fertility regulation is determined by the market and sociological factors. Market mechanisms alone lead to the concentration of higher fertility rates among rural and poor populations, which in resource-poor areas contributes to poverty, concentrated disproportionately among women and children (Paolisso and Yudelman 1991), and to environmental degradation.

Absent institutional capabilities to implement and enforce environmental protection policies, deliver social services and redistribute wealth, the result will be increasing income inequality, short-term investment horizons among the poor and mining of natural resources.

The strength of government's position on population growth is the most influential policy tool. Targets establish measurable qualitative and quantitative goals as an expression of the strength of the government's position. They are a powerful implementation tool to measure progress but must be tied to an evaluation component

Mini-case

Before 1972, Mexico had a pronatalist policy. The country had a growth rate of 3.09% and a total fertility rate of 6.7 children per female. In 1972, government family planning programs were implemented, and in 1973 the population law was revised "with the object of... stabilizing the growth of the population." In 1976, President Lopez Portillo established a target growth rate of 2.5% to be achieved by 1982 and further reduced to 1.0% by 2000. The government expanded and promoted family planning services through the Ministry of Health and the Institute of Social Security.

By 1982, the public sector supplied 53% of the contraception used by women reporting, compared to 31% for pharmacies and 15% for private clinics, hospitals, and physicians.

These population control efforts met with success: In 1990, Mexico had a growth rate of 2.01 and a total fertility rate of 3.11 children per female (Merrick 1986, 43).

Experience indicates that government efforts to slow growth rate are best achieved when three conditions exist (Wolfson 1986):

- Visible leaders at high levels clearly state and promote a national policy and social consensus favoring smaller families.
- A National Population Council is established to play a coordinating and monitoring role and is located in the Ministry of Interior or Planning.
- Knowledge about family planning and fertility regulation services is broadly disseminated through the educational system, communications media and public and private organizations.

Programs to Increase the Status of Women

Lower fertility rates are positively correlated with the status of women. Higher educational levels, increased income, better nutrition and health and lower infant mortality rates are all correlated positively with lower fertility rates (Turchi, et al. 1991).

Fertility reductions resulting from increased status are realized in the long term. The relationship between status and excess fertility is interactive. Any reduction in fertility allows a women to make better use of programs for improving status and increases their cost effectiveness.

Only at higher socioeconomic levels does employment become a viable alternative to bearing children—with a positive effect on fertility rates. Employment becomes a strong effect only when combined with other measures of women's improved status, plus a vigorous family planning program.

Programs to improve the status of women increasingly promote access to fertility regulation as a human right.

Where female education is low, family planning programs have minimal effect; conversely, female education has little effect where family planning services are unavailable (Birdsall, et al. 1984, 81).

Specifying and Enforcing Responsibilities of Men

Policy statements are increasingly recognizing the importance of specifying men's responsibilities for family planning.

Mini-case

Nigeria's policy, adopted in 1988, states: "Appropriate information and education programmes shall be designed and implemented to promote awareness by men of their responsibility for adequate caring and for having appropriate family sizes . . . . Appropriate legislation shall be promulgated to discourage and punish men who put underage females in the family way . . . and to ensure that men provide paternal support for any children they father (Isaacs, et al. 1991)."

Promoting Smaller Families

A variety of ways has been used to change community family size norms. Some examples (Isaacs, et al. 1991) include the following:

- Mass media education of the public on population issues and family planning, including the use of traditional folk media.
- Including population dynamics and sex education in school curricula and teacher training.
- Providing population education and information to government workers, health care personnel and others involved in social services.
- Providing incentives that lower the cost of using fertility regulation techniques and increase the benefit of delaying or limiting pregnancies.

Providing Fertility Regulation and Family Planning Services

Fertility regulation and family planning services can be provided through public- and private-sector delivery systems. These services are increasingly being integrated into broadly based maternal care, health and nutrition programs that emphasize increased family welfare from child spacing.

When state subsidies are financed appropriately (i.e., the tax system is not highly regressive) and programs are voluntary, public involvement in family planning will improve individual and social welfare. The lowered fertility rates induced by subsidized family planning services reduce inequality in two ways: (1) as a direct form of income to poor households; and (2) through the impact on per capita household income. The adverse effects of high fertility on children's health and education are greater in poor families.

A dollar spent on family planning services leads to more fertility reduction than does a dollar spent on education, health, or other programs. One study observed a sevenfold difference in fertility reduction attributable to family planning programs, nutrition programs or education schemes for rural women.

Studies indicate that over one-third of the women in the developing world who became pregnant in the last 12 months did not want another baby. It costs $10 to $20 per year to provide one women with the means to control her own fertility, to safeguard her own health and that of her children, and result in lower births in Latin America by 35%.

Incentives and Disincentives

Incentives are any payments (cash or in-kind) given to individuals, couples or groups to use contraceptives or to delay or limit childbearing. Examples are payments for attending a community meeting providing information on contraception; compensation for time and travel costs for visits to a family planning clinic; and entitlements designed to change the relative costs of children and thus directly reduce the demand for children.

Disincentives withhold benefits from those who exceed the desired family size norm. Although the use of incentives and/or disincentives has been common in Asia, it has been considered inappropriate in Latin America, where the voluntary nature of fertility regulation programs has been stressed.

Mini-cases

- *Ghana allows only three paid maternity leaves per employee and pays government officers child allowance and travel expenses for only three children.*
- *Thailand pays delivery costs for couples undergoing postpartum sterilization, provides scholarships and housing assistance for smaller families, and ties community incentives such as agricultural credit and animal husbandry to achieving particular fertility targets.*
- *Korea provides medical care and education allowances to two-child families if one parent has been sterilized.*
- *Nepal gives a 20% increment in pension for government employees who have only two or less living children at the time of retirement, a non-negotiable development bond with a ten-year maturity period to couples with two living children or less at the time of sterilization.*

and free education for all children of parents who have undergone sterilization after two living children.

- *China provides paid leave for fertility-related operations. Some provinces provide a monthly subsidy for one-child families. To overcome preferences for sons, medical and educational entitlements are in some cases granted preferentially to parents of a single female child. Some provinces require that parents return bonuses obtained for the first child when they have a second child. Some areas impose a 10% tax on income on parents who have a third child.*

Note: Examples taken from Isaacs, et al. (1991) and Birdsall, et al. (1984).

Incentives can be provided by private development organizations. A private group in Thailand offers technical assistance to contraceptive users. Benefits include credits for agricultural inputs such as livestock, feed, construction materials, fertilizer and seeds.

Incentives also can be targeted to entire communities, as illustrated by the two mini-case examples below.

Mini-cases

- *Indonesia gives prizes and popular recognition to communities that meet fertility targets.*
- *Thailand rewards villages that achieve population targets with development projects such as biogas plants or cooperative stores.*

Note: Examples taken from Isaacs, et al. (1991) and Birdsall, et al. (1984).

Redistributing Population

Efforts to slow rural-urban migration have focused on redistributing population. There is no evidence that these strategies slow population growth rates. The social, environmental and financial costs of these policies have often been high, and few have achieved their demographic objectives (Birdsall, et al. 1984, 58).

The colonization of undeveloped areas has been viewed as a solution to problems of population redistribution, political instability, lack of jobs and inequitable access to land. While demographic pressure and associated social and political tensions are released or redirected in the short run, colonization has often resulted in unsustainable mining of natural resources. A review of World Bank-assisted schemes concluded that it is usually more efficient to intensify production in already-settled areas than to move people to new areas (Birdsall, et al. 1984, 58).

Developing new urban centers without establishing the institutional capabilities for managing development activities may displace the deleterious impact of population growth to new areas that may be even less capable of sustaining high populations.

Urban growth provides economies of scale and differentiated labor markets that accelerate the pace of technical innovation. However, unemployment tends to be higher, and air pollution, congestion, social disturbance and crime increase disproportionately with city size (Birdsall, et al. 1984, 59).

Legal Reform

Existing laws, regulations, directives and informal procedures often affect population growth, composition, distribution or migration even though they are not intended to do so.

Reviewing, analyzing and identifying needed changes in regulations issued by ministries, codes of medical ethics, labor and tax codes, civil and family codes, etc., are essential for an effective population policy.

Information Collection and Evaluation

Policies are strengthened when a specific agency is made responsible for evaluating programmatic activities.

Research Questions

High fertility rates are a function of child mortality rates, per capita family income, economic status of women, education of women, maternal health, contraceptive use, abortion, and age of marriage. For rapidly growing urban populations, rural populations in resource-poor areas, and rural populations in well-established agricultural areas:

What is the explanatory power of each of these independent variables in terms of changes in fertility rate?

What is the explanatory power of fertility rate in terms of changes in these variables?

Where is it most cost effective to intervene?

What are the distributional impacts of intervention at these different points?

If measures of economic growth included an expanded system of national accounts to include draw down of the value of natural resource capital, what would be the marginal product of an extra person compared to the average product?

Which sectors of the population gain and lose by population growth in economies where it is likely that the social costs of high fertility exceed the private costs and where market failures such as lack of property rights or distortions are likely to heighten any negative effect of rapid population growth?.

What are the consequences of rural out-migration from densely settled areas? Does it produce a change in rural land use i.e., land consolidation and more extensive land use patterns? What are the marginal long-term costs of migration to fragile lands?

What is the relationship between population growth and changes in social and political institutions, development of democratic processes, and the creation and adaptation of new technology?

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ANNEX: COMPARATIVE COUNTRY POLICY MATRICES

The following tables summarize forest management policies, agricultural and livestock policies, and land tenure and colonization policies for Belize, Guatemala, Honduras, El Salvador, and Costa Rica. The tables are an experimental method for displaying and contrasting policies as well as identifying needed information and sharing of ideas from one country to another.

The material in these tables was taken from the country specific sections of *The Green Book—An Environmental Policy Sourcebook* (May 1992), by George Johnston, Hilary Lorraine, Tom Wittenberg and Greg Michaels. *The Green Book* was prepared for USAID/ROCAP—RENARM, under contract with Abt Associates Inc., the Agricultural Policy Analysis Project, Phase II (APAP II) and in conjunction with Development Strategies for Fragile Lands (DESFIL). The five natural resource policy inventories conducted under APAP II for Belize, Costa Rica, El Salvador, Guatemala and Honduras provided the information base for *The Green Book* country sections. The authors augmented and updated this information for many of the topics. In addition, the May 1992 draft of *The Green Book* organized the policy inventories and supplemental information according to the policy taxonomy.

The tables were prepared by Rosemary Hyson of Abt Associates Inc., Research Assistant for the Agricultural Policy Analysis Project, Phase II.

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FOREST MANAGEMENT POLICIES

Concessions for the Use of Public Timber	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Duration	1 year.	10 years or less.	Indefinite.	None.	None—tied to quantity.
Conditions/ Restriction	• Licenses-renewal uncertain.	• Prohibited on protected species and within conservation areas. • Fines/penalties exist but are ineffective.	• Approval by COHDEFOR[1] of area, method, and condition of harvesting. • Ownership of operating sawmill or purchase of rights from owner.	• 1973 law gave Forest Service responsibility for forest management strategy. • 1984 regionalization of Ministry of Agriculture left the Forest Service without authority to enforce the law.	• Granted for a fixed quantity in a given area. • Forest management plan—DGF[2] approval required. • Plan must meet requirements for regeneration and diameter limits.
Award Process	• Subject to definition by the Minister on annual basis. • Used as political favors.	• Regulatory groups, DIGEBOS and CONAP, have little influence over vested interests and illegal land conversion.	• Chosen for existing sawmills, efficiency, and sustained rotation. • Non-competitive, and generates little revenue. • Still not secure as government has allowed some small industries into others' areas.		• DGF approval of plan. • Competitive.

[1]Honduran Corporation for Forest Development

[2]Dirección General Forestal

FOREST MANAGEMENT POLICIES

Forest Revenue Systems	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Charges on Concessions	• Royalty per cubic foot of standing timber on public/private land (does not reflect different market values). • Royalties on private land are half of those for reserves and Crown lands. • Too low to be effective.	• Stumpage fees at fixed base on standing wood value, voluntary plantations are exempt. • No proper valuation system was considered, effects unknown.	• In 1989 stumpage fee became based on standing timber rather than harvested timber on trucks. • Variable rate tested, deemed unmanageable. • Aggregate effect unknown, overall level of fees low.	• Stumpage fee on trees in saline water forests (2.50 Colones per tree).	• Ad valorem tax (10%) on stumpage value, determined by DGF, paid before cut. • 20% deposit paid in advance to guarantee regeneration or replacement.
Charges on Timber Harvested		• Municipal tax on cutting of high value hardwood and pine—eliminated in 1990 Forestry Law.	• Flat rate applied to extracted logs on trucks until 1989. The 1974 law set rates at L12.00/m^3 for hardwoods and L6.00/m^3 for pine; the rates have been increased over the years.		
Charges on Forest Products Production	• None, domestic forest products are highly protected.	• 2% tax on sales of forest-raw material derived products—eliminated by 1990 Forestry Law.	• Municipal government tax of 1-2% of product value. • Indirect tax for central government based on amount produced.		
Charges for Services			• Mill owners must pay fee to landowner for timber from private lands.		
Charges on Productive Factors					

FOREST MANAGEMENT POLICIES

Forest Revenue Systems	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Charges on Companies			• Corporate income tax.		
Government's Involvement in Concessions, Harvesting, and Processing	• Government's Recurrent Revenue account; nothing to Forestry Department.	• Portion of stumpage fee goes to DIGEBOS Forest Fund. • DIGEBOS' limited resources and staff prevent it from monitoring all the licenses it grants. The result is selective enforcement and the opportunity for local politicians to manipulate the system.	• Stumpage fees and flat rate are set and collected by COHDEFOR. • COHDEFOR still owns most hardwood areas.		• DGF establishes stumpage price. Ad valorem tax revenue use: • 8% to DGF to finance its operations. • 10% to municipality of harvest • 10% to local coops and corporations. • DGF lacks the capacity to administer tax system effectively. • DGF's use of control point inspections only catches a small portion of illegally harvested timber.

FOREST MANAGEMENT POLICIES

Industry and Trade Policy	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Domestic Industry and Resource Protection Policies	• Protection of domestic timber industry.	• Protection of domestic timber industry.	• 1974 Forest Law: Protects domestic forest resources from foreign exploitation and restricts foreign investment in primary and priority industries. • Promotes formation of industrial and commercial forest companies. • 1992 Law for Agricultural Modernization & Devt. refocuses mandate of COHDEFOR toward resource protection.	• Protection of forest resources.	• Protection of forest resources. • Selective protection of domestic forest enterprises, including: import tariff waivers; accelerated depreciation of capital goods; eased access to credit; and facilitation of exports, tax credits and exemptions.
Direct Government Involvement in Forest Related Industries	• Price controls and restrictions on lumber products and imports.	• Restrictions on log exports.	• From 1974 to the present, all aspects of the forest and forest product industry (harvesting, processing, marketing and exports) were controlled by the state firm, COHDEFOR. • Under the 1992 Law, COHDEFOR will be released from its monopoly over marketing, processing and production to concentrate more on sustainable forest management.	• 1985 ban on forestry in El Impossible forest; in 1989 area established as a national park. • Regulation of salt factories on coastal lands and the use of mangrove areas in aquaculture.	• All forestry activities regulated by DGF: installation, function, expansion, transfer, relocation, all wood and wood product trade. • Construction of new saw mills is prohibited by DGF.

FOREST MANAGEMENT POLICIES

Industry and Trade Policy	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Price Controls	• Price controls. • Import restrictions.	• Bans/quotas on log exports.			• Ban on log exports. • Control of log transport. • Wood product imports restricted.
Industry Structure			• To date, owned by one public sector organization; further analysis once shift toward private ownership occurs.		• No vertical integration or secure access to timber. • Pursuit of short-term economic gains from resource exploitation is encouraged by lack of competition and no incentives to invest in long-term resource/industry development.

FOREST MANAGEMENT POLICIES

Reforestation	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Fiscal Incentives and Policies	• Income Tax Act allows deductions for reforesting, however it is unclear whether such activity would be deductible anyway as a production cost. • No fiscal incentives have resulted in significant reforestation.	• 50% income tax deduction and 100% land tax exemption (latter is rarely collected to begin with). • Small-scale incentives exist under the Fondo Forestal Privado (Private Forest Fund) and the Fondo de Fomento Forestal (Forest Promotion Fund).	• Currently no fiscal incentives exist. • A proposed law calls for establishing a Forestry Fund to support reforestation projects, providing inputs, credit, and supervision and extension services supplied by COHDEFOR; proposed programs must have the objectives of protection of natural pine forest; prevention of the negative effects of shifting agriculture, cattle grazing, and the deterioration of forest and soils in watersheds; and providing new forest resources for energy or industrial purposes.	• No fiscal incentives exist. • Government policy to view forest land as idle and subject to confiscation is a disincentive to reforestation. • Banking system does not provide credit for reforestation.	• Numerous fiscal instruments support reforestation, including zoning, tax credits, tradeable tax certificates for farmers, and subsidized credit • Fiscal incentives are strong enough for demand to exceed supply for the fiscal incentives; as a result, the government has established an annual cap on the amount funded.
Public Reforestation Projects	• To date, no government projects have resulted in significant reforestation.	• Massive projects in the Northeast to restore forest cover in critical areas, including the CELGUSA zone. • DIGEBOS, CARE, and Peace Corps sponsor agroforestry programs on small farms in the Highlands and western region; success of agroforestry has been limited.	• COHDEFOR—administered programs covered by donor resources; one example is COHATT's Reforestation Program which offers food-for-work incentives for reforestation, agroforestry, and conservation activities to small rural producers.	• Government efforts have been few and had limited success—less than one-half of the 20,000+ acres planted since 1973 have survived.	

Product Price Controls	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Price Ceilings		• Reference, not fixed, prices for rice, beans, corn, and sorghum. • Determined and defended by the National Agricultural Marketing Institute (INDECA). • If its resources permit, INDECA intervenes in the market to defend the reference price; in recent years lack of resources have severely limited their ability to do so. • Overall ceiling policy determined by the Internal Commerce Directorate of the Ministry of the Economy. • Effect of INDECA's intervention on the natural resource base is unclear.	• Maximum prices are fixed for a significant number of foods and basic products at the wholesale and retail level, including: sugar, edible oil, coffee, chicken, wheat flour, eggs, powdered and fluid milk, margarine, bread, pastas, butter, and salt. • An autonomous public entity, BANASUPRO (Sup lidora Nacional de Productos Basicos) is responsible for regulating maximum retail prices for basic foods. • BANASUPRO's means to enforce the prices is limited. • BANASUPRO also operates a food store chain to supply basic foods at subsidized, stable prices, particularly to poor consumers. There is little evidence that either objective is met and BANASUPRO operates at a loss.	• Price ceilings for wheat and wheat flour, molasses, coffee, cotton seed, margarine and shortening.	

AGRICULTURAL AND LIVESTOCK POLICIES

Product Price Controls	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Price Floors and Support Prices	• Minimum producer prices for several crops, including sugar, citrus, bananas, and basic grains. • Price supports/controls have resulted in 33% growth in exports of bananas, citrus, and sugar over the past three years. • License required for production of bananas. • Quotas and licenses exist for sugar.	• Price supports exist for milk, flour, and sugar. • Overall policy determined by Internal Commerce Directorate.	• IHMA, the grain marketing parastatal, guarantees minimum prices for some basic agricultural products—essentially only the four grains, corn, beans, sorghum, and rice. • IHMA acts as a buyer of last resort for excess supplies at the minimum price. IHMA also sells in times of excess demand to defend the price. • Constraints, such as limited access to IHMA buying stations, the requirement that sellers be registered with IHMA, and IHMA's inability to make timely payments limit its effectiveness.	• Price floors for sugar and sugarcane.	
Price Bands			• Price bands are currently being investigated to replace IHMA's guaranteed price system. • Proposed bands would add transport/internal marketing costs to international price and a 30% tariff to shield producers from international price fluctuations and developed countries' protectionist policies.		

AGRICULTURAL AND LIVESTOCK POLICIES

Input Subsidies and Prices	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Credit	• Banana Control Board authorized to provide credit to the Banana Growers Association.		• Provided at subsidized rates, set at a maximum by the government. • Favorable reserve requirements for agriculture and livestock loan portfolios. • Credit availability is biased toward the use of short-term, chemical inputs and fertilizer and pesticide-intensive export crops.		• Until recently, loans at subsidized rates and favorable terms were available for livestock production.
Pesticides					• Direct subsidy recently eliminated. • Lower import tariff (5-15 percent) than average duty (26.4 percent). • Extra .5 percent duty imposed on pesticide imports to support Ministry of Agriculture's crop production service. • When used in the production of export crops, pesticide imports are exempt from duties in the same proportion as value added to the final product price.[1]

[1] Lutz and Daly, 1990

AGRICULTURAL AND LIVESTOCK POLICIES

Input Subsidies and Prices	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Fertilizer			• Price controls act as subsidy.		• Extra .5 percent duty imposed on fertilizer imports to support Ministry of Agriculture's crop production service.
Agricultural Machinery		• Price supports for gasoline, diesel, and propane.	• Subsidized prices for petrol derivatives and other fuels encourage use of machinery.		
Other			• Water user fees not enforced—less than 5% of revenue collected.	• Pervasive import tariffs exist, but their impact is unclear.	• All imported inputs used in the production of export crops are exempt from import duties in proportion to their value added over the final product price.

AGRICULTURAL AND LIVESTOCK POLICIES

Direct Government Activities	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Input Marketing	• Provided by the Banana Control Board to the Banana Growers Association.				
Product Marketing	• Belize Marketing Board (BMB)—government parastatal mandated to purchase, store and process major grains. • Sugar Industry Control Law—regulates manufacture and sales by license and quota; controls entry in and out of sugar production. • Citrus Production & Processing Law—controls sale of citrus from producers to processor, all processing of fruit, and product exports and imports. • Banana Industry Law—authorizes Banana Control Board to produce, purchase, sell or export bananas and grant licenses for production and export.		• The grain parastatal, IHMA commissioned to: set guaranteed prices, control foreign trade in cereals, operate storage facilities, collect information on production and markets, and provide technical marketing assistance to private and public agents. • Due to limited fiscal resources, IHMA only affects 10% of basic grains production.	• Sugar commission administers export quotas, domestic sales regulations and sugarcane prices. • Reforms in 1989 ended state control over marketing of coffee, cotton and basic grains, but their impact has yet to be determined.	

AGRICULTURAL AND LIVESTOCK POLICIES

Regulation of Pesticides	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Direct Regulation	• 1985 Pesticides Control Act regulates classification, import, manufacture, storage, and application of pesticides. • Act calls for six pesticide inspectors, only two of these positions have been filled. • Resources for monitoring and enforcement are a constraint. • Government does not always respond to reports of river contamination.	• Law on the Regulation, Importation, Creation, Storage, Transportation, Sale and Use of Pesticides delegates authority for regulation to Ministries of Public Health, Economy, and Works. • Ministries are charged with establishing and enforcing decrees to ensure that pesticide use is in accordance with public health, agriculture, and livestock.	• 1967 Plant Health Law; 1980 Regulatory Act for the Registry, Import, Manufacture, Storage, Transport, Sale and Use of Pesticides; and 1981 Regulatory Act for the Control of Pesticides, Pharmaceutical and Biological Products of Veterinary Use establish regulations for pesticide imports, sales, manufacture, storage, transportation, use and application of pesticides. • Regulations establish sanctions for failure to comply with regulations. • Proposed reforms would require an agronomist to supervise quality control on sales and setting tolerance levels pesticide residues according to the FAO's international CODEX Alimentarius. • Ministry of Natural Resources charged with enforcing regulations, however they do not have the resources to be effective.	• Directorate of Agricultural Defense (DDA) regulates the trade, use, registration, handling, storage, and disposal of pesticides. • Classified by toxicity; however, there is no difference in actual regulation. • Agriculture Technology Center (CENTA) analyzes pesticides for registration and quality and examines food for pesticides residue. • All new agricultural chemicals must be registered; registration must be renewed every three years. The importer/supplier must pay for CENTA's registration analysis. In addition, the supplier must show that the chemical is currently approved for a similar use in the originating country. • Import fees and taxes exist; are similar for all pesticides. • Labeling must be color coded and have clear instructions about proper use, hazards, and active ingredients; high illiteracy rates detracts from labeling's effectiveness.	• Pesticide use guidelines are set by the Ministers of Health and Labor; the Minister of Agriculture is charged with enforcing the guidelines. • Registration of all pesticides, according to U.S. EPA standards is mandatory; regular visits to agrochemical distributors help ensure compliance. • Chamber of Pesticide Importers assists in controlling distribution and general information on their proper use. • The Environmental Code and the ECODES strategy are two proposed laws that seek to integrate the regulations of different institutions into an overall framework, and weave together environmental quality and management into a national environmental planning system.

AGRICULTURAL AND LIVESTOCK POLICIES

Regulation of Pesticides	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Indirect Regulation	• Education programs are favored over levying of fines for violations. • No standards established for testing pesticide residue in crops or beef. • Promotion of banana and citrus production, in addition to shifting from subsistence to commercial agriculture is increasing the use of pesticides, causing soil erosion and water contamination.	• Substitution of nontraditional crops for traditional consumer products has increased the use of pesticides; no information known of the magnitude of its impact on natural resources.		• CENTREX, a center for streamlining imports and exports by the Ministry of Economy helps regulate pesticide imports. • BFA[2] is a government agricultural development bank that distributes pesticides as part of their integrated loan packages; recipients have no say in the package of inputs they are given, which often contain many agro-chemicals. • USAID, UNDP, IDB, and CABEI make recommendations and/or place restrictions on pesticide use in their projects. • IPM programs are available from CATIE. • APA,[3] a trade organization, has educational programs to promote better use of chemicals/pesticides.	• Ministry of Agriculture has some IPM programs, but other extension in proper pesticide use is ineffective. • USAID has made an Environmental Impact Statement and a Pesticide Use Assessment prerequisites for the technical assistance components of its Northern Zone Consolidation Project. • Tariff structure favors imports. • Overall shift away from traditional cultivation toward export or cash crops that use more pesticides.

[2] Agricultural Fomentation Bank

[3] Association of Agricultural Suppliers

AGRICULTURAL AND LIVESTOCK POLICIES

Regulation of Pesticides	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Cross-border Effects			• U.S. regulations are been an effective control in forcing products for export to the U.S. to be treated with EPA-approved pesticides.	• U.S. Department of Agriculture and Food and Drug Administration regulations at U.S. ports have influenced pesticide use in agricultural exports from El Salvador. • OIRSA[4] advises on methods to prevent transfer of pests/disease from neighboring countries. • Decree 229 (1961) provides for quarantines at ports of entry to protect agricultural resources against pests and diseases from abroad; Decree 145 regulates imports of plants, animals, their products, and sub-products. • Until 1989, the overvalued exchange rate, which made imports inexpensive, encouraged the use of pesticides.	

[4] International Regional Organization for Agricultural Health

AGRICULTURAL AND LIVESTOCK POLICIES

Livestock Policies	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Credit			• Subsidized credit available. • Low reserve requirements for livestock loan portfolios encourage banks to grant credit for livestock production. • Cattle acceptable as collateral.		• Available at subsidized rates and favorable terms for livestock; the desire for loans with negative real interest rates prompted much deforestation. • Cattle acceptable as collateral. • Loan funds used for consumption—high degree of delinquency. • Subsidies have recently been cut off.
Fiscal Incentives and Export Preferences		• Preferential tax rates designed to promote beef exports; resulted in increased cattle production.			

AGRICULTURAL AND LIVESTOCK POLICIES

Livestock Policies	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Tenure			• Expropriation policy encourages landowners to clear forests and use land for livestock. Area of land cleared for livestock production exceeds what is necessary due to fear of expropriation. • Difficulty of classifying land as idle on cattle ranches is additional insurance against expropriation. • The legalization of land rental under the recently adopted Agricultural Sector Reactivation Law will enable excess land used for cattle grazing to be used more productively.		

AGRICULTURAL AND LIVESTOCK POLICIES

Livestock Policies	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Provision of Public Services					• FODEA[5] provided loan bailouts for small ranchers facing bankruptcy with moratoriums on payments, exemption from input taxes, and renegotiation of their loans at favorable rates. The practice encourages continued inappropriate use of land for pasture. • Little coordination exists between national banking system and agencies charged with protecting wildlands; FODEA gave credit subsidies for livestock to owners of national forest reserves until 1988.

[5] Promotion of Agriculture and Livestock Development

LAND TENURE AND COLONIZATION

Land Tenure and Markets	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Property Rights	• Information on de jure/de facto land tenure is not readily available. • Government-owned land can be obtained by the public for free- or leasehold via the Crowns Land Ordinance; political expediency, rather than concern for natural resource conservation determines the land's allocation. • Government retains mineral rights on all public lands, whether leased or granted to the private sector. • Land Utilization Ordinance: Regulates land outside cities/towns—Ministry of Natural Resources can impose protective measures for watersheds, prevention of soil erosion, and control sub-divisions.	• Rural small landowners plagued by insecure tenure. • The amount of land registered is twice the country's area; one half the land is without title. • Few smallholders who purchased land in the highlands actually registered the land.[1]	• Maximum holding sizes exist; sizes, however, are high to promote cattle production. • Agrarian reform legislation is attempting to change land distribution, but has increased expropriation and tenure insecurity. • Vacant/idle land is subject to expropriation (forested land is considered idle). • Government has authority to grant land titles, give concessions for using forest, fishery, water, and mineral resources; and can impose conditions on those titles. • Neither an agrarian cadastre or a complete registry exists.	• Tenure is extremely insecure. • Public and private lands have taken on the characteristics of open access resources as the military cleared forests on the premise of national defense, regardless of ownership.	• Widespread lack of clear legal title to land. • All land in Costa Rica is claimed by private owners or the government. The State can expropriate land; otherwise, the constitutional right to private property often supersedes government intervention for natural resource management. • Environmental policies that override property rights are not enforced. • Little progress has been made on a use classification/zoning system to shape private land rights.

[1] From a survey by the Land Tenure Center

LAND TENURE AND COLONIZATION

Land Tenure and Markets	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Ownership Distribution	• 2.2 million of the 5.7 million acres of Belize is suitable for agriculture; less than 15% (626,009) is being cultivated. • 60% of productive agricultural land is large land-holdings, primarily corporate-owned.	• Majority of land privately owned, excluding the Petén. Government owns 22% of the land. • Very unequal distribution of land. • 72% of available land is occupied by large export enterprises; .2% of the landholdings accounts for 36% of the total land area. • 28% of holdings of less than one acre are subsistence farms. • Distribution is even more skewed in the best farmland areas. • Precise distribution of tenurial systems among indigenous peoples is not known—tenure ranges from close community to individual control.	• Highly skewed land distribution. • Best quality/least fragile land used extensively for ranches. • Highly erodible hillsides and forested and protected areas are over-used by the land poor.	• 90% of land owned by 16% of landowners. • Private landowners control over two-thirds of cultivated land; only 34.2 % is planted in crops. • 84% of pasture is privately owned, but only 36% considered used. • Overall, 20% of private land is considered idle.	• Lack of clear titles prevents many farmers from obtaining credit and qualifying for subsidies to improve land use. • Uneven distribution of land ownership and population growth create substantial pressure on fragile lands.

LAND TENURE AND COLONIZATION

Land Tenure and Markets	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Land Markets	• Land Tax Act—Exempts rural land of less than 100 acres on which permanent improvements have been made from taxes to discourage speculation.	• Rental market is very active; large landowners on the South Coast often rent land on annual basis, requiring renter to return is as pasture.[2] • Large landowners rarely subdivide their land for sale.	• Agrarian Reform Law bans private land rental. • Mortgaging land granted by the reform, a cooperative's sale or transferal, and levying taxes or charges[3] on land granted by the reform is prohibited. • Larger landowners "lend" campesinos parcels of forested lands for 2-3 yr periods, in exchange for the land being cleared and returned as pasture. • Market is not active; there is little land for sale to attract new and more efficient producers.	• Cumbersome processes for transferring land titles inhibit market activity: expensive topographic surveys are required and difficult to obtain; registration, tax payments, and lawsuit proceedings are lengthy. • Buyers are tentative and limited due to rural unrest and uncertainty about agrarian reform. • Credit is only requested by a small portion of both non-reform and reform sector producers. • Non-reform producers requested more credit and had a higher denial rate denial than reform sector producers, who had few credit applications, but a higher rate of approval. • Phase I created coops for credit; their productivity is lower than anticipated. • The agrarian reform law's Phase III beneficiaries and farmers renting parcels receive more credit approval though few take advantage of it. • Law to Finance Small Rural Landholding (Feb. 1991) established a land bank to finance voluntary land transactions for small producers.	• Two distinct markets exist, one for large parcels of land that is well-established and a more informal one dealing in smaller parcels of land. • Squatters without clear title comprise the informal market for the most part; this arrangement encourages "professional" squatters and clearing of public land.

[2] Land Tenure Center

[3] Loan [illegible]ery charges by public credit institutions are excepted.

LAND TENURE AND COLONIZATION

Colonization and Reform	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Direct Government Policies		• Agrarian Transformation Law which includes land grants in the Petén and northern areas of the country, development of national farms and cooperatives, and reorganization of small plots—has resulted in loss of large forest and wildlife areas. • Law also called for tax on idle land to spur use of high-potential land for agriculture; tax rate too low to be effective and special interest groups have suppressed the law's application. Ambiguous definition of *idle* opens law to interpretation and corruption. • Land grants in the Petén were recently placed under DIGEBOS's jurisdiction—effectiveness is questionable, given DIGEBOS's limited resources. • INTA,[4] responsible for providing land to landless workers, is required to leave 10% of colonized land for forestry; this has never been implemented.	• Implementation of the 1974 Agrarian Reform Law has been limited. • Titles for land distributed under the 1974 law are not granted until the land value has been paid off (20 years). • INA,[5] is in charge of resolving land tenure, exploitation, recuperation and distribution issues. • 1974 reform law awards parcels, titles land, and provides beneficiaries with credit and technical assistance. It was intended to transfer inefficiently used land from large holders to rural farmers without land. • The law defines measures for "efficient" use: for livestock, 90% must be pasture and have 1-2 animals per hectare, depending on the region; for crops, 90% of area must be covered by permanent plantations. Also, irrigated land must be kept free from drainage, flood, and soil erosion problems.	• Land redistribution began in 1980 with Agrarian Reform Decree 153, which called for reform in three-phases. • Phase I expropriated farms of 500 has. or more and redistributed them to cooperatives. Agricultural land held by the government prior to the reform was to be redistributed or designated as national reserve areas. • Phase II was never fully implemented and originally called for expropriation of land between 100 and 500 has.; in 1983 the minimum plot size was increased to 245 has. Phase II also provided a mechanism to transfer privately-owned lands to the government for settlement. • Phase III reassigned land to farmers working parcels of 7 has. or less. The recipients could then petition FINATA[6] for title to the land. • Decree 747, passed in April 1991 granted coop members the option to divide the coop, obtain title and have the option to purchase the plot; they may also opt to remain as a cooperative.	• The land law in Costa Rica has two basic principles: occupation and use of public domain lands convey certain property rights on individuals; and through a legal mechanism, homesteaders could establish recognition of their claim. • In the rapid expansion of forest and wildlife reserves over the last 20 yrs, the government is legally bound to purchase land for the occupants who have title and compensate untitled occupants for any improvements to the land, including clearing forest. • Compensation for land is based on: access to roads, area cleared, and existence of permanent crops, pasture, buildings, etc.; soil, climate, and suitability for agriculture/current use are not considered.

[4] National Agrarian Transformation Institute
[5] National Agrarian Institute
[6] National Financial Institute for Agricultural Lands

Colonization and Reform	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Direct Government Policies (cont'd)			• Only 6% of privately owned land is subject to expropriation. Through 1988, 455,175 ha. had been expropriated, 72% national land, 17% private, 10% municipal land. • Holdings of less than 50 hectares and those used for key agricultural commodities (banana, plantain, oil palm, sugarcane, coffee, pineapple, citrus and tobacco plantations) were excluded from expropriation. • The recently passed Agricultural Modernization and Development Law addresses some of the 1974 law's inadequacies, setting clearer criteria for expropriation, enabling beneficiaries to obtain land on individual or collective basis; establishing a seed capital fund that offers beneficiaries financing for inputs; accelerates the titling process; and eliminates exemption of lands smaller than 7 hectares.		• Institute for Agrarian Development (IDA) is redistributing large blocks of both state-owned land and holdings purchased from private owners as small farms. In redistributing, IDA gives no consideration to land use or suitability when defining the size of the plot. Some plots are located in forest reserves which complicates matters. • Government does not recognize forest management as an appropriate use for such land. • Owners receive more for cleared land than forested and are not compensated for their standing timber.

LAND TENURE AND COLONIZATION

Colonization and Reform	Belize	Guatemala	Honduras	El Salvador	Costa Rica
Indirect Government Policies		• DIGEBOS and CONAP[7] have little influence on the powerful vested interests in the Petén. • Environmental effects of INTA's projects are supposed to be analyzed by DIGEBOS, but DIGEBOS's influence over INTA's decisions is questionable.	• INA provides training courses and at the field level on organization of settlements/cooperatives and production methods. Management training is not well developed, only covering accounting. • INA and BANADESA collaborate on credit, according to BANADESA's standards.		• Historical tradition of use and improvement, which includes clearing land, conveying property rights has contributed to deforestation.
Spontaneous Settlements and Invasions	• Spontaneous settlements by Belizian Indians and undocumented immigrants—mostly Salvadorans and Guatemalans—scattered throughout country. • Settlers use slash and burn techniques in forested or unimproved areas for subsistence agriculture.		• Invaders of agricultural land are not supposed to be eligible to receive land under the new law, but INA's slow distribution of land and the success of organized groups in gaining titles through invasions have encouraged this practice.		• The existence of a secondary/informal land market where small parcels to which participants may or may not have clear title enables "professional" squatters, to clear land, claim the parcel, and then sell it in the informal market.

[7] National Council for Protected Areas