Caribbean Planning for Adaptation to Climate Change
Component 8

A Review of Economic Instruments and Methodologies For Meeting Environmental Goals

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Preface

The Caribbean: Planning for Adaptation to Climate Change (CPACC) is a project of the Organization of American States, the Global Environment Facility and the World Bank; its goal is to help Small Island Developing States explore innovative economic incentives for combating the adverse effects of global climate warming.

Over the long term, CPACC and related programs could assist the twelve Caribbean member countries in developing the skills and planning resources that can stimulate industry, government and citizens to adopt behaviors for reducing the impact of rising sea levels. The intent is to provide the groundwork for formulating minimum-cost economic measures that promote decision making favorable to sustainable use of these fragile island ecosystems.

Much environmental law throughout the world has been based on top-down, or command and control regulation. While it penalizes undesirable behavior, command and control generally provides little incentive or reward for behaviors that are innovative and surpass minimum regulatory requirements. For some years now, however, policy makers have been employing market-based incentives to stimulate industry and citizens to meet regulatory ends and to go beyond them. While the use of such incentives has been associated with larger industrial countries, they have also been employed in Latin America and Caribbean countries.

Though most often used to generate revenue for national and local governments, market-based incentives have been demonstrating a good deal of promise for achieving environmental aims. They are not a panacea for the limitations of command and control regulation nor will they necessarily replace them; furthermore, they can also be problematic if strong legislative and institutional infrastructure is not in place to support their effectiveness. Still, market-based incentives can provide effective tools for more effectively achieving environmental goals.

This report reviews and highlights these incentives, often referred to as economic instruments, with applicability to the Small Island Developing States of the Caribbean. Its aim is to assist policymakers in becoming more knowledgeable about such instruments in order to develop policies that encourage new and efficient ways of meeting environmental goals. Towards such ends, this study is a first step that will lead to pilot projects in two Caribbean countries, Antigua and Barbuda and St. Kitts and Nevis, for developing a set of market-based incentives to deal with one specific effect of

global warming, sea level rise. Though each of the Small Island Developing States differs in terms of political, social and economic structures, the market-based incentive plans that result from the pilot projects should serve as models for others to develop an integrated approach to a major environmental issue tailored to their own needs.

Section I examines the implications of climate warming and rising sea levels for Caribbean island ecosystems and their economies. Section II discusses command and control regulation and market-based incentives and their implications for achieving environmental goals. Section III examines the application of economic instruments in numbers of situations in Caribbean and Latin American countries, both for producing revenue and achieving environmental goals. Section IV describes key planning issues that policy makers in the Antigua and Barbuda and St. Kitts and Nevis will need to consider in designing strategies that can meet the ecological and economic threat of rising sea levels.

I

Sea Level Rise and Economic Competitiveness in the Caribbean

For years, international debate on global warming focused on whether there was unambiguous scientific evidence of rising temperatures or if the apparent increase was really only cyclical. Though some scientists still argue against the warming trend, most now believe that temperatures have been increasing (Ott 1998). To what extent warming is considered to be more the consequence of human activities than natural changes — for example, emissions from factories, power generating plants, automobiles, agricultural fertilizers, jet aircraft — may depend less on scientific arguments than on political and cultural ones.

Regardless of the cause, there is general acknowledgment that climate warming will cause melting of glaciers and polar ice caps and thus lead to rising sea levels that pose serious challenges for island nations as well as coastal areas throughout the world. The Small Island Developing States of the Caribbean could well be in a double bind: in addition to having large coastlines and relatively small land masses, these nations are also located in the hurricane belt which leaves them vulnerable to the damaging effects of massive storms.

While rising waters pose serious ecological problems, they will also impact Caribbean social structures and economies. In some states, more than 60 percent of the population live within two kilometers of the coast (Perch 2000). Natural beaches, coral reef ecosystems, and other amenities that make tourism a primary source of revenue are especially vulnerable. While economic activity includes agriculture, services and light manufacturing, they generally do not account for sizeable import revenue. As Perch (2000) points out, "The intensity of tourism development both past and present continues to reshape land-use characteristics in many islands." The Coastal Planning for Adaptation to Climate Change project identifies five distinct physical impacts that rising sea levels will bring:

- Submergence of low-lying wetland and dryland areas
- Erosion of soft shores by increasing offshore loss of sediment
- Increased salinity of estuaries and aquifers
- Rising coastal water tables
- Increased and more severe coastal flooding and storm damage

In 1997, an international conference in Kyoto, Japan led to worldwide accords on goals for reducing greenhouse gas emissions in order to stem the

human contribution to global warming (Ott 1998). Even if the world's nations were to meet the goals for such reductions, there is a good deal of scientific uncertainty as to how long it would take to slow warming and its consequent effect on sea level rise. All countries with coastal shorelines, not only the Small Island Developing States of the Caribbean, are faced with the need to take precautionary measures to actively meet the projected deterioration of shorelines, many of which have already been subjected to different kinds of ecological damages from human activities. Measures could mean, for example, comprehensive plans to restore important wetland areas or mangrove forests or to significantly reduce the volume of solid wastes that are generated.

There can be great difficulties in developing policies for an integrated plan that balances economic development and ecological integrity. In part, this is because of the complex economic base of island economies with their large dependence on tourism and supporting industries and services, all of which can stress natural resources, for instance, beach ecosystems, corals reefs and freshwater reserves.

To attract visitors to the Caribbean's natural beauty, a number of the island nations, not unlike developed and developing countries, have actively promoted development — as a result, some shorelines have been cleared for construction and left more vulnerable to rising seas. Generally, development of the coastal zone has not been managed with sustainability of natural resources as a primary consideration. For some countries, support of development has meant tolerating the destruction of ecologically-undervalued mangroves and wetlands. The result has been continuing encroachment of the sea because of inadequate safeguards to limit the inevitable consequences of wave action.

The Inter-American Development Bank (1998) identified the following environmental concerns as major issues.

- Land use and resource allocation conflicts in the coastal zone (e.g., property rights issues and the impact on mangroves, reefs and fisheries)
- Degradation of coastal ecosystems (e.g., expansion of coastal infrastructure and the impact on coastal habitats)
- Depletion of fishery stocks (e.g., the effects of fishery bycatch on biodiversity)
- Declining coastal water quality from land-based sources (e.g., capacity of coastal water to dilute the effects of increasing volumes and concentration levels of effluents- wastewater discharge and other contaminants)
- Increasing coastal erosion, flooding and shoreline instability (e.g., coastal flooding, erosion and landslides from storms, combined with the effects of deforestation, poorly designed coastal structures, and sand mining)
- Impoverishment of coastal communities (e.g., the impact of depleted fishery stocks on low income, dependent communities)

Given the objectives that island states have to maintain competitiveness in attracting tourists, the often unplanned and unpriced consequences of resulting development has been the continuing loss of natural assets, for example, damage to sea grass meadows and reef systems.

Development of tourism, for example, has led to significant pressure on other natural resources — a high demand for fresh water, large volumes of waste streams, disposal of solid wastes and further stress on the terrestrial and aquatic environment. Competition among the islands as well as with other nations trying to attract tourism revenue leads to pressure to create even more amenities, for instance, golf courses and cruise ship visits, which can place even more stress on natural and coastal resources.

In supporting such development, governments have often provided subsidies and other tax advantages, which can impose hidden costs on social welfare. Such practices have occurred in agriculture, for example — in a number of cases subsidies have led to overuse of chemicals such as pesticides and fertilizers that now threaten groundwater tables and aquifers, thus aggravating stress on natural resources. The impact has been more immediate for these small island states.

The irony of this situation is that the natural ecological beauty of the Caribbean islands, which has attracted visitors throughout the world, has been deteriorating. Damage to these ecosystems diminishes the value of the tourism experience, the effects of which can ripple throughout the economy, jeopardizing the economic viability of supporting industries such as commercial and recreational fishing, agriculture, light industry and service support businesses.

If actions are to be effective in stemming further deterioration of coastal zones that will only be exacerbated by sea level rise, policy makers must identify, develop and implement innovative management strategies that encourage sustainable practices. The environment and economy are inextricably bound to each other; in the long run, deterioration of natural assets will lead to erosions of economic and social welfare.

Environmental policy for addressing these issues has most often relied on command and control (CAC) regulation. While there are notable exceptions, CAC regulations have generally been inflexible in setting environmental goals: if companies or individuals are not in compliance, they are fined or sued. They are not designed to reward achievement for meeting goals, let alone for spurring innovation to go beyond those goals.

For more than a half century, economists and policy analysts have been exploring other options for achieving regulatory aims — these are market-based incentives or economic instruments that encourage industry and

citizens to *want* to meet environmental objectives. In one sense, such incentives are "carrot-and-stick" approaches — with strong economic incentives, businesses and individuals will have a self-interest in meeting environmental goals because there will be cost savings which, in the short- or long-term, could mean higher monetary return. As Perch (2000) observes, economic instruments are "policymaking tools that use the market framework for equalizing costs for consumed environmental costs."

The design of comprehensive strategies by Caribbean states for meeting particular environmental goals would have to be undertaken within the economic structure and cultural framework of each country. Market-based incentives are not new to these countries but integrated programs that target large environmental concerns such as the projected impacts of rising sea levels are. In this regard, Section II examines command-and-control regulation and market-based instruments as a basis for setting and achieving environmental goals.

Section II
Economic Techniques for Achieving Environmental Goals

Throughout the world, policy makers have placed an increasing emphasis on developing management policies that internalize environmental costs. According to Huber et al. (1998), the challenge is to identify "policies and strategies that make it in everyone's economic interest to utilize environmentally sound products and services." The aim of such policymaking is to reduce externalities, which — with regard to the environment — occur when the use of an environmental amenity does not pay all of the costs or benefits.

Rio Declaration — Principle 16

"National authorities should endeavor to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment." (United Nations 1992) .

Externalities arise when the actions of an economic agent affect parties other than those intended — and they abound in environmental issues. Externalities can be positive; for instance, the restoration of a wetland or mangrove forest for enhancing nutrient cycling processes could lead to improved water quality or a more desirable aesthetic experience or improved fishing (or all three). However, externalities are more often associated with their negative implications, for instance, sand mining of beaches for construction activities, which can increase erosion from waves and storm surges. Or the growing tourist appeal of snorkling and diving — though these activities have helped create new jobs and led to other economic benefits, they have also led to deterioration of reefs and, in a ripple effect, impacts on recreational fishing and water quality.

Because positive and negative scenarios for such externalities have not been priced or internalized by the agent, and are an indicator of market failure. Without appropriate financial incentives to change, such activities would persist with deleterious environmental consequences in the case of negative externalities. Internalizing the marginal social cost (marginal external cost plus the private cost) into the private costing would more properly address such incorrect pricing. In small economically vulnerable states, just one significant negative environmental episode may be more than enough to generate far reaching consequences on quality of life, and on social and economic welfare.

In effect, there are two major policy approaches for addressing negative externalities, (1) command and control (CAC) regulation and (2) market-based instruments or a combination of both. A third, voluntary compliance, appeals to civic responsibility that encourages consumers and businesses to develop sound environmental practices. Though there are many examples of civic

responsibility by consumers, their effectiveness will likely depend on targeted education and outreach programs that convincingly demonstrate the value of environmental responsibility to individual and communal self-interest.

Command and Control Regulation

Command-and-control generally refers to direct regulation of the amount of allowable pollution, the control technology to be used, or the control of allowable actions, for instance, the amount of wetlands that can be filled. Under such a mechanism, for example, a firm would be allowed a legal limit of pollution emissions beyond which it would be warned, fined or penalized, as applicable for the violation. To achieve this level of acceptable emissions/effluents, the firm may have to install abatement equipment or adopt abatement technology that would attempt to correct some of this under-costing of its operations. All firms would be expected to achieve the same level of emissions, regardless of individual efficiency. Failure to comply with such standards would usually result in fines or legal action.

The efficacy of such a policy tool will depend on factors such as its clarity and purposefulness, administrative costs, institutional capability and capacity. Additional factors to be considered include the quality of resources and information available to the regulating agency and the quality of supporting institutions, for example, the legal system and other enforcement mechanisms. Effective monitoring for compliance may impose a burden on understaffed regulatory agencies due to factors such as the problem of asymmetry of information or bureaucratic procedures, for example, the lag in implementing or enforcing regulations. Command and control such as this is often considered weaker and more costly to implement than achieving regulatory goals based on market incentives.

Market-based Incentives

Market-based incentives or economic instruments have their foundation in the operation of market forces. Their aim is "to align private costs with social costs to reduce negative environmental externalities." (Huber et al. 1998) In contrast to strict command and control approaches, they attempt to more efficiently reduce negative externalities by internalizing as precisely as possible social costs, thereby promoting a more efficient use of resources.

Unlike command and control policies, which may directly regulate the quantity of allowable pollution, the control technology to be used or the control of actions that are allowable, market-based incentives are designed to motivate pollution abatement or other positive actions based on natural market forces. Such an approach acknowledges differences in production processes that exist among firms. "Market-oriented instruments allow

polluters and resource users to find their own best mix of controls or responses and therefore result in lower private costs than other approaches." (Huber et al. 1998)

A score of instruments have been developed and employed throughout the world, including Latin America and the Caribbean; key among them are the following:

- **Pollution Charges.** A payment or fee charged to the polluter which varies with the quantity of pollutants being emitted.

- **Subsidies.** A payment or tax concession that provides financial assistance for pollution reduction or plans to mitigate pollution in the future.

- **Deposit-Refund Systems.** A system that imposes an up-front charge to pay for potential environmental damages which is later returned as a refund for some positive action, e.g., bottle recycling.

- **Permit Trading Systems.** Rights to allow a certain amount of pollution are distributed and then allowed to be traded.

- **Performance Bonds and Liability Payments.** A bond is placed to guarantee compliance with environmental requirements and then refunded when compliance is achieved. Liability payments are made to compensate for damages caused by pollution or another activity.

- **Final Demand-Information.** Disclosure to final consumers regarding environmental performance, e.g., eco-labeling.

Choosing appropriate economic instruments to reach specific goals will depend on a number of factors, among them, the extent to which there is understanding and acceptance of environmental objectives among all stakeholders, as well as the extent to which the application of such tools is not a disincentive to investment or business development. Regional agreements among the Small Island Developing States which may be competing for the same tourists are likely to be an important factor in the future. As Perch (2000) observes, if one country proposes an economic instrument but others do not, the result can be "unintended competition between countries, i.e., 'beggar-they-neighbor,' which does not benefit the region or the individual countries in the long run."

While there may be many benefits in employing economic instruments, a program of market-based incentives for achieving environmental goals requires strong commitments by government and its institutions. Such programs have high demands for monitoring,

enforcement and administration. Russell and Powell (1996) caution that the use of seemingly efficient instruments demands institutional capacity of varying complexity with accompanying costs. They recommend a measured approach that is geared to stages at which institutions are more developed to cope with the requirements of market-based incentives.

Section III that follows examines major economic instruments and includes brief examples of how they have been used in Small Island Developing States.

Section III

Applications of Market-Based Incentives to Achieve Environmental Goals

Numbers of Caribbean island and Latin American countries have been employing economic instruments for some time now, though their primary use in general has been to bring revenue in to national and local government, or to provide favorable conditions for attracting business and industry. Still, market-based incentives have been employed as well for environmental purposes. Refund-deposit systems and environmental levies are one example, which many countries have instituted to deal with the significant problem of waste management (Perch 2000). In Tobago and Trinidad, to cite another example, water pollution rules are being drafted which would necessitate a permit size. Table 1 summarizes examples of economic instruments that have been used in selected Latin American and Caribbean countries to date; the discussion that follows elaborates on their use, with the focus on Small Island Developing States.

Table 1. Examples of market-based instruments in selected regional countries.

Market-Based Instrument (MBI)	Barbados	Colombia	Ecuador	Jamaica	Trinidad and Tobago
Credit Subsidies	X	X	X		
Tax/Tariff Relief	X	X	X		Pending
Deposit-Refund Schemes	X	X	X	X	X
Waste Fees and Levies	X	X	X	X	X
Forestry Taxation	X	X			
Pollution Charges		X		Pending	
Earmarked Renewable Resource Taxes		X	X		
Earmarked Conventional Tax Levy		X			
Tradable Permits	Pending				Pending
Eco-Labeling	X	X			
Liability Instruments		X			X

Source: Huber et al. (1998), Market-Based Instruments for Environmental Policymaking in Latin America and the Caribbean: Lessons from Eleven Countries

Economic Instruments

Pollution Charges

Pollution covers broad categories of environmental contaminants that includes airborne emissions from smoke stacks, effluents from waste water

treatment plants, industries and crop lands, and runoff from the land. To encourage innovation and higher compliance in meeting reduction goals, polluters might be charged for the volume or amount of discharge. Pollution may also refer to products or energy usage — in these cases, charges might be imposed with the expectation of reducing usage, which could encourage changes towards more environmentally-friendly products. Overuse of pesticides and fertilizers can be curtailed through such charges, particularly if revenue generated can be applied to targeted, as well as public, education programs on their environmental impact. For such programs to have any chance of success, they will need to appeal not only to civic responsibility but to economic and social self-interest.

In Trinidad, the Environmental Management Authority has proposed legislation to impose a tax on imports of products referred to as Ozone Depletion Substances (ODS). Such charges, which seek to encourage the purchase of substitute products that are more benign, also reflect the "real cost" of products that have an environmental impact.

Under the Environmental Levy Act of 1996-1998, Barbados has levied a range of charges. One, *ad valorem* levy of one percent is applied to goods imported in containers made of glass, plastic, metal, or paperboard, as well as the containers themselves. Another is being applied to the disposal of discarded imported appliances, vehicles and tires. Revenues generated are contributed to a Consolidated Fund, earmarked for activities related to the disposal of such appliances and automobiles. Care must be taken in estimating costs in these kinds of efforts; in this case, Perch (2000) found that the cost of disposal exceeded the revenue, which may be due to underestimating the specific charges. For Barbados, as for other Caribbean island states with their scarce and obviously valuable land mass and coasts, disposal of non-biogdegradable wastes — for instance, tires, automobiles, and appliances — poses a challenge that increases with economic progress. While economic size of a country may limit the feasibility of a viable market for recycling plastics and other non-biodegradables, there is still an important environmental benefit in collecting these wastes, many of which might end up in streams and rivers.

St. Kitts and Nevis have been trying to reduce the ecological impact of tourist visits on the carrying capacity of the country by imposing an Environmental Levy or departure tax on tourists; for cruise ships, the charge is based on the number of passengers. With the same objectives, Antigua now requires a charge per cruise ship passenger. These types of charges could well be integrated with public education programs, for tourists and citizens, that explain how these funds are being employed to help better protect natural resources by developing patterns of sustainable use.

Subsidies

Subsidies are payments or tax concessions; while they have been used to encourage development in many states, they are also being employed for meeting environmental goals. Designed to encourage reduction in pollution, they have a more indirect effect on prices and costs than pollution charges. With the aim of altering behavior, subsidies can encourage the use of more efficient technology or equipment and reductions in the use of agrochemicals and fertilizers.

Subsidies might be applied efficiently as discounts on loans (soft loans) for specific construction or investment activities that meet strict building and environmental criteria. Fiscal incentives such as tariff exemptions for pollution-abating equipment, or allowance of accelerated depreciation in specific areas and for a specific period would encourage the purchase of equipment that is more fuel-efficient and less polluting. In Barbados, for example, duties are not charged for environmental equipment that is to be used in hotels; in Jamaica, investment in abatement technology in the industrial sector brings with it some tax relief.

The efficacy of subsidies increases with the specificity of their application. If their applications are clearly targeted to the directly affected groups, the returns would be greater than if they were more generally applied. Establishing a clearly defined life time for such subsidies ensures movement much closer to the intended economic and environmental results.

Deposit-Refund Systems

Deposit-refund systems are fairly widespread in the region; in general, their aim, especially with regard to bottles, cans and plastics — has been to reduce littering. To control such solid waste disposal and encourage recycling, deposits are required for products that may be a potential source of pollution. A refund is provided when the product is returned to authorized collection centers. Depleted batteries, tires, used motor oil, insecticide cans, and empty soft drink containers (bottles or cans) are among the products that come under such efforts. In one program, refunds on returns are provided by the retailer; in another the producer is responsible for collecting discards and

making refunds. While most programs for citizens are voluntary, Mexico is a rare exception among many countries in requiring that used batteries be turned in when new ones are purchased (Huber et al. 1998).

In Barbados, the refund system for beverage containers is differentiated with higher refunds paid for glass than for plastic containers. With deposits refunded by retailers and supermarkets, the system has also led to revenue, small as it is, for indigent people who collect and return discarded containers for refund. While there is anecdotal evidence of declining volumes of such litter on beaches and elsewhere, littering remains a problem. It should be noted that deposit-refund instruments have had limited impacts on reducing generation of waste products (Perch 2000). Furthermore, this instrument in itself has not fostered markets for recycled goods — with a lack of markets, re-use and recycling as a key method for reducing such waste may be difficult to sustain.

In Trinidad, where the Barbados model was considered together with those of the United States, Canada, and Switzerland, the Environmental Management Authority has proposed legislation that would make it mandatory for consumers to return containers, with the refund of the deposit due on return. Under this rule there would be provisions exempting other voluntary systems (e.g., Caribbean bottles) already in force; other mechanisms such as public education would try to influence compliance. The Environmental Management Authority in Trinidad and Tobago is also developing a similar system for tires, batteries, and appliances.

In Antigua and Barbuda, importers of glass bottle beverages pay a deposit to the Customs Division and receive the refunds on the re-export of the containers. (Parker 1999). However, this scheme is considered more as a device to protect domestic competitors and if so, a subsidy more expensive to others than the protected parties.

Performance Bonds and Liability Payments

Performance bonds are types of liability payment instruments, which call for an agent to deposit a specified amount of money in the form of a bond as a security deposit guaranteeing compliance with environmental requirements. When compliance is met, the bond is refunded; if it is not met, the bond is forfeited and can be used to mitigate damage that may have occurred. These voluntary mechanisms are more economical than mandatory approaches and also create a role for non-governmental organizations.

Trinidad has successfully used performance bonds to control damage from oil-related activities. In Barbados, a voluntary damages scheme has been proposed under which a hotel can post bonds with a monitoring agency or

non-governmental organization, which would be empowered to assess costs for damages caused. Regardless of the mechanism applied, the latter case deserves special consideration, since much of the destruction of an estimated 60 percent of the country's fringe reefs is attributed to activities related to the large-scale development of tourism on the south coast. The government of Barbados has since embarked on a program to redress or mitigate the consequences of such "unpriced" activities through its Integrated Coastal Management Plan.

Liability payment instruments are set within a legal context in which resource users have rights *and* obligations: if responsible for pollution or related damages, the user pays to compensate for the damages. Unlike voluntary legal requirements, the country's legal system would play a more central role. If legal institutions are weak or severely backlogged, liability payments may not be an effective instrument. Another potential limitation may be the financial inability of victims of environmental damages to develop a scientific case or obtain strong legal representation. On the other hand, the application of liability insurance to command and control regulation can confer positive benefits to programs for ensuring the integrity or preservation of coastal resources.

Among Small Island Developing States, Barbados, St. Kitts and Nevis, and Jamaica have enacted Coastal Zone Management legislation. Though definitions of coastal zones may vary among countries, making it difficult to compare economic valuation of natural resources, those resources that make up the specific coastal zone can still be direct and substantial beneficiaries. For example, building codes or regulations can include environmental safeguards, which once fully complied with and certified, could entitle the builder or owner to preferential rates for insurance premiums. A potential drawback has been the impact of changing climate and weather patterns: the frequency and severity of storms have generated sizable awards for damages. One consequence has been an increase in the cost of premiums; another has been more stringent criteria for liability insurance. Heavy damage to coastal resources resulting from natural climatic conditions and human activities seem to call for more effective controls that would at the least minimize such damages. Liability payments may be one means for trying to encourage better practices.

Permit Trading Systems

A first assumption underlying tradable permit systems is that pollution of a certain kind will continue to occur even with innovative technology and waste processing. Some industries will be innovative in reducing pollution below their allocations; others will not. The aim of this instrument is to reward the innovative industries by giving them a credit, which they can hold or trade. For instance in the "emissions trading" program to improve

local air quality in the United States, "firms that reduced emissions below the level required by law received 'credits' usable against the higher emissions elsewhere (Stavins 1998). Companies could trade emissions reductions as long as the total emissions were not greater than the total limit. A major advantage of tradable permits is that they allow for a more flexible combination of the "standard tools" of command and control and price incentives to achieve efficiency.

Tradable permit systems have been the most frequently employed economic instrument in the United States (Tietenberg 1997; U.S. EPA 1992); they have been used, for example, in the Emissions Trading Program, the lead phasedown, and water quality permit trading in the U.S. (Stavins 1998). These permits would be offered for sale and their prices determined by market forces. The attraction of a system of tradable permits is that it encourages efficiency: an innovative company could sell excess quotas to less efficient companies without need for direct regulation. Such a system of tradable permits might be applicable to development activities in shoreside areas. In the tourism sector where the level of demand is more stable and relatively established, permits can be used for trading point-source effluents, such as water use or effluent discharges by hotels.

In Trinidad, a proposed permit trading law relates to water pollution. Under this system, polluters would pay for permits based on the amount of pollutants they would be entitled to discharge. The objective is to reduce pollutant loads, as well as to more accurately estimate the cost of such activities by the respective permit holder. The cost of monitoring compliance suggests the need for a robust deterrent or disincentive to non-compliance.

In Antigua and Barbuda, the fisheries industry is essentially artisanal or small-scale; it is characterized by part-time employment for many who are unschooled in sound fisheries practice. As a result, there have been damages to the marine environment. Uncontrolled or unmonitored fishing activities clearly would lead to further damage. There is an opportunity to explore the feasibility of permits to achieve goals of preserving fish stocks, while not disrupting the livelihood of *bona fide* fishers (Doug Lipton, University of Maryland Personal Communication). Individual tradable fishery quotas are being implemented in Chile, though the effects of their implementation are not yet available (Huber et al. 1998).

Tradable development rights are another related economic instrument. Given a situation where property rights are unambiguously determined, easement can be created where environmental criteria can be established for land use, especially as pertains to coastal assets. Under a scheme of tradable rights, greater protection can be afforded the coastal zone and its ecosystems.

In a recent study and review, Huber et al. (1998) conclude that while there are many opportunities for employing tradable permits in the Caribbean, "the major constraint to their implementation will be finding an equitable initial allocation and trading regime that is consistent with local market-reform processes."

Final Demand-Information

Information-based instruments seek to affect consumer choice by providing information on product characteristics or businesses that adhere to environmental standards. Hotels and other tourist sector businesses that satisfy environmental criteria could be certified as doing so, which could well have the effect of motivating other participants to join the program, domestically and regionally. The International Standards Organization (ISO) series provided by the Caribbean Export Development agency would be a mechanism for compelling producers to comply with similar criteria in order to remain competitive in a market where there is strong consumer advocacy. Such incentives, sometimes referred to as Final Demand Instruments, could appeal to the increasing environmental awareness of many tourists, who could be encouraged patronize businesses that earn seals of approval for environmentally acceptable practices. The Caribbean Association for Sustainable Tourism (CAST) has partnered in a certification program for doing just this.

Strengths and Weaknesses of Economic Instruments

As the preceding examples show, there has been a good deal of experimentation with market-based incentives in the Caribbean region and they are being used in various ways for environmental management. However, that use has largely been on an ad hoc basis rather than as components of integrated sustainable environmental planning. For the most part, the goal of economic instruments in Small Island Developing States has been to raise revenues. "Other objectives such as reducing environmental impacts or improving cost-effectiveness of regulations have been underemphasized or not attained." (Huber et al. 2000). And yet, though relatively few economic instruments are employed purely for environmental management, Perch (2000) concludes in a recent study that the use of such instruments in the region "has contributed to the improved management of natural resources and environmental management issues."

Market-based instruments such as tradable permits, user charges and green taxes are a set of tools that can go a long way toward improving the cost effectiveness of existing regulations. This is to say, "[they] can enhance environmental management and equity, rationalize markets, reduce social costs and increase institutional revenues." (Huber et al. 1998)

They are not so much a substitute for command and control (CAC) but can significantly help in stimulating innovative ways to improve the cost effectiveness of applying and enforcing CAC regulations. For both, a strong infrastructure is essential: administrative demands are high in both cases, as are monitoring and legal requirements, enforcement and collection systems.

In designing market-based incentives, the main challenge is to apply within the context of the same institutional and political barriers that constrain the command control approach (Huber et al.1998). To employ economic instruments successfully and to bring stakeholders to agreement as much as possible, providing incentives for meeting environmental goals are far superior to punitive measures for not meeting them. "This does not obviate the need to 'punish' environmentally-insensitive behavior but from the study, the more successful of the instruments have been those which were based on incentives rather than disincentives." (Perch 2000)

There are important needs that policy makers and planners must take into account in developing a plan of market-based incentives for achieving environmental goals. Those needs begin with strong institutions, unambiguous legislation and adequate financing. Market-based incentives, like command and control applications, require effective monitoring and enforcement, which again mean reliable funding support. They will also require the support of stakeholders — as Perch (2000) observes, "any process that ensures participation by stakeholders, is scientifically sound, has political support of affected sectors is key to ensuring the implementation of instruments that address more than one factor associated with an environmental issue."

Factors Associated with Success and Problems in Implementing Economic Instruments

Success

- Political will and support
- Political stability and buy-in by key stakeholders
- Economic effectiveness
- Scientific soundness
- Simplicity of design

Problems

- Political resistance by those who feel adversely affected
- Complexity of administrative system and bureaucracy
- Potential inconsistencies between national environmental policies and international commitments and agreements
- Economic instruments mismatched to the problem
- Inadequacy of administrative systems to support implementation, especially monitoring

This summary is based on Perch (2000)

Section IV examines the process for developing an integrated plan of market-based incentives for environmental management. In this particular case, the goal is to design two pilot projects in Antigua and Barbuda and St. Kitts and Nevis that employ

economic instruments as a means for countering the expected impacts of sea-level rise. In the long run, the results of these pilot projects should provide models for planning that other countries in the region can learn from and adapt to their own needs.

IV

A Methodology for Implementing Market-Based Incentives to Meet the Challenges of Sea-Level Rise

There is no single methodology that can be applied to implementing the adoption of market-based instruments that will ameliorate the impacts of global climate change in Caribbean nations. Thus, this section is intended as a guide, one based on experience in Caribbean and other nations, to the steps and issues that need consideration in designing an implementation plan.

The tool kit of market-based incentives includes a large number of economic instruments, more than those surveyed in the previous section. To begin with, it is important to optimize the projected uses of these instruments. The infrastructure of most administrations in the Small Island Developing States is generally too limited to "oversee and enforce a plethora of instruments." (Perch 2000) This is why particular instruments need to be selected judiciously; towards this end, Perch (2000) recommends that governments must at least do the following:

- Carefully assess the environmental problem or issues and the contributing factors in order to better identify an economic instrument.

- Use pilot studies to ensure political acceptability as well as economic and environmental effectiveness.

- Ensure a regular review process, which evaluates the performance of the economic instrument and can address any changes or development in the sector.

- Ensure the flexibility of economic instruments to respond to changes in parameter, whether they are related directly to the environmental issue or to wider economic development maters such as the decline of markets or in the economic wealth of the country.

In developing pilot projects to address rising sea levels in Antigua and Barbuda and St. Kitts and Nevis, certain issues and concerns can be listed as important considerations.

1. Clearly define the potential impact of projected sea-level rise on Antigua and Baruda and St. Kitts and Nevis.

2. Develop a set of objectives and goals that can help protect against those impacts.

3. Assess economic instruments, their flexibility and the extent to which they help internalize environmental costs. Consider the command and control regulations that may already be in place and how economic instruments can complement them to increase their cost-effectiveness.

4. Identify and consult with the stakeholders. What is the likely basis for support? For rejection? Plan public forums.

5. Analyze current legal measures and their compatibility with economic instruments; consider the feasibility of reforms that would create a more favorable legal environment.

Ten Commandments for Market-Based Incentives

Realism. Do not try to implement policies and instruments beyond the available institutional capacity.
Gradualism. Establish plausible and enforceable norms, standards and guidelines.
Legal Flexibility. Legislation must allow for the possibility of low-cost revisions.
Institutional Integration. Economic agencies and the legislative branch must be included in planning.
Leadership. Identify stakeholders, constraints and the means for building consensus.
Participation. Stakeholder involvement is critical. Equity issues should be identified, evaluated and dealt with.
Market Reliance. Avoid high transaction and collection costs, incorporating market-based instruments into environmental policy.
Revenue Generation. Cost-recovery through correct pricing may be the most effective way to build consensus and guarantee financing.
Human Resource Development. Public sector environmental units should be kept small and should rely on external expertise, concessions and research centers.
Continentalism. While OECD experiences should not be rejected, there is a need to increase ties among regional agencies whose economic and cultural contexts may be more familiar.

Adapted from Huber et al. (1998)

6. Assess relevant market forces, economic agents and the rationality of economic incentives; pay particular attention to the potential role of market-based reforms to enhance the effectiveness of environmental management.

7. Identify environmental damages in which costs are not internalized and their relation to various economic and domestic activities, for instance, pollutant emissions and transportation, land degradation and natural resource exploitation, water pollution and sewerage.

8. Develop evaluation criteria that will measure the (a) effectiveness of achieving the original or modified goals; (b) efficiency in quantitative terms, if possible, benefits vs. costs; (c) equity, or the distribution of cost burden and benefits; (d) flexibility to changes in markets, technology, knowledge, or social, political and environmental conditions.

9. Evaluate the results of the pilot studies and make necessary adjustments.

10. Recommend policy, institutional or legislative actions, e.g., decentralization, or legislation based on the polluter-pays principle.

These steps are methodological guidelines for developing an integrated plan of market-based incentives in Antigua and Barbuda and St. Kitts and Nevis to ameliorate the projected impacts of sea-level rise. A major challenge in implementing such a plan will be the development of economic instruments that change the pattern of consumption and production in order to foster sustainability (Perch 2000).

Such a goal is a process that will itself need to be sustained; for this reason, market-based incentives must be designed to earn revenue in order to ensure continued programming. Furthermore, to achieve discernible goals, objectives must be designed so that they can be assessed and evaluated for success or failure. In case studies of the use of economic instruments in the Caribbean, Perch (2000) identifies the importance of (1) assessing consumption and behavior patterns and their changes and (2) economic valuation as part of the design process to ensure scientific soundness of fee structures. While the challenges of effecting behavioral change that can substantially help ameliorate environmental decline may be daunting, there are strong indications — based on recent efforts alone in the Caribbean — that important progress can be made in the years ahead.

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