

**MACROECONOMIC POLICIES AND THE
ENVIRONMENT: CHOICES FOR
THE CARIBBEAN**

by

DeLisle Worrell
CENTRAL BANK OF BARBADOS

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This paper suggests ways of matching economic policies with their environmental outcomes so as to illuminate the alternatives available to policy-makers with respect to environmental enhancement. It offers a way to measure the cost of an environmental enhancement strategy. The paper sets out a menu of policies, their effects on the environment and their costs. It avoids suggesting which of the available alternatives is preferable. That is something that the citizens of each country must decide through the political process. The responsibility of technicians is to ensure that such a decision is fully informed.

The paper focusses on specific areas of current importance where Caribbean policy-makers have a choice: water quality, coastal and marine ecology, waste disposal and energy use.¹ This is not an exhaustive list. Other issues of importance such as cultural heritage, cultural development and ecological diversity are omitted to limit the paper to a manageable scope but they may be addressed with the same techniques. Environmental concerns which are

not directly affected by decisions of Caribbean nations - for example, global warming - are also excluded.²

In general, the macroeconomic policies to be considered fall into three categories: taxation, additional government expenditures and regulation. Taxation can be used to discriminate in favour of environmental enhancement where categories can be clearly defined and where it is difficult and costly to shift the burden of taxation from the area of environmental degradation to other areas. With respect to government expenditure, all governments in the Caribbean operate under tight fiscal constraints which offer no scope for increasing government expenditures. Therefore, additional expenditure or transfers in favour of environmentally-friendly policies have to be at the expense of expenditures in other areas. Additional expenditures on the environment have an opportunity cost, measured in terms of other government programmes which have to be sacrificed in order to make room for them. There are constraints on the government's ability to regulate efficiently. Regulations must be tailored in line with national preferences. If they contradict social norms or aspirations, the regulations will be flouted or circumvented, even though it may take some time before the society is able to devise mechanisms to undermine them.

Water Quality

Major factors affecting the water quality in the Caribbean are residues and wastes of industry and agriculture that contaminate rivers and ground water reservoirs. Poor water distribution systems lead to a high proportion of loss and inadequate supplies in critical areas. The water distribution system is inadequate in some countries and leaves large areas unserved. Water quality may also be affected by the lack of zoning regulations to protect water catchment areas from intrusive developments and industrial wastes. Governments have implemented, and are considering, a variety of policies to address these issues.

One possibility is a complete ban on pesticides and herbicides. The impact of such a measure would have to be assessed, not only in terms of its implication for water quality but also for its effect on the output of agriculture. If it were desirable to avoid a decline in agricultural output, alternatives would have to be sought for pest control and for nurturing the growth of crops. Pest resistant varieties of major agricultural products are not available on a sufficiently wide scale to permit the complete avoidance of chemical pesticides nor are there natural predators for all the pests which

afflict Caribbean agriculture. Similar problems arise with the supply of natural fertilizers which, in any case, also have the potential to pollute the water supply.

A less drastic alternative would be to adopt the standards of industrial countries for the use of pesticides and herbicides. However, this might not completely eliminate the threat to water supplies. In practice, it is probably not possible to completely eliminate that threat. The immediate objective might be to reduce the danger to safe water supply significantly from existing levels.

There is a cost associated with either of these regulations. Administrative machinery must be put in place to promulgate, monitor and enforce the regulations. As suggested earlier, this cost (and all other costs mentioned subsequently) can be accommodated within government's budget only at the expense of some other government project.

The regulation of liquid runoff from industrial plants also contributes to the improvement of water quality. This policy has similar costs of establishing

regulatory mechanisms. In addition, the cost to firms of cleaning up their effluent may be reflected in the cost of their product, reducing their competitiveness. The extent to which they are able to produce relatively clean liquid waste may also be determined by the availability of relevant technology. The implementation of regulations must begin with a list of possible improvement measures which might be stipulated by regulation. Their implications for the cost structures of the firms and the cost of government regulation should be estimated. Government may consider taxing effluents as an alternative form of regulation. The tax should be high enough to make it uneconomical for the firm to continue to pollute. Unfortunately, this threshold may not be firmly drawn. Furthermore, there are often differing scientific opinions as to what constitutes dangerous contamination of effluent. The effectiveness of alternative technologies for production which have different impacts on waste and the sensitivity of the market to increases in product prices necessary for more environmentally-friendly production processes must also be taken into account.

There are alternative sources of finance for investment in the improvement and extension of water distribution systems: higher user charges may impose

a disproportionate burden on the poor; transfer by government to the water authority incurs an opportunity cost in terms of other government programmes foregone; borrowing for water development also incurs an opportunity cost to provide for loan servicing.

The zoning of industrial, commercial and residential development may serve to keep pollutants away from the fresh water supply. Compromises may have to be made in the light of existing patterns of development and of the demands for economic growth. Zoning also involves an opportunity cost in terms of government administration and there may be further costs of relocating activity which is sited in the wrong zone.

Coastal and Marine Ecology

The factors affecting coastal and marine ecology include soil erosion, the development of wetland areas, the intensification of marine sporting activity, the urbanisation of the coast, the overexploitation of marine resources, harmful practices by ships and boats and a number of factors whose causes are still not well understood.

Soil erosion causes increased runoff into rivers and coastal areas, altering the marine environment to the detriment of corals and other marine life. Soil erosion is caused by a general decline in husbandry, by the expansion of subsistence agriculture in some countries and by growing urbanization.

To arrest the decline in husbandry, it may be necessary to give financial incentives for the expansion of agricultural output. These financial incentives have an opportunity cost in the government budget. It may also be necessary to provide financial transfers to encourage environmentally-friendly subsistence agriculture. For example, subsidies might be provided for the purchase of fuel so as to reduce the cutting down of trees. Codes might be developed and enforced to control urbanization and to ensure that development does not take place in areas where it will promote erosion and destroy the marine environment. Such policies will incur a cost of administration and they may drive up the price of real estate. It may be possible to provide incentives through the tax system for careful urbanization (surtaxes on vacant lots, etc.).

Wetlands may be protected by the development of national parks, a policy that incurs the opportunity cost of government transfers to run the park service. Surtaxes on the development of wetlands may not have the desired effect; developers may choose to pay the tax and exploit the wetlands. Zoning is a less comprehensive approach than the establishment of national parks which may be less costly to administer but also less effective in protecting wetlands.³

Among the problems caused by intensive marine sporting activity are pollution, unsuitable development and coastal and river bank erosion. Regulation and policing are the most usual measures for addressing these issues. Estimates should be made of the cost of administering them more effectively. Surtaxing the most damaging kinds of activity may not be practical or effective.

The urbanization of coastal areas creates problems of waste disposal at sea: governments need to provide for investment in sewerage systems. Careless coastal development has led to beach erosion; provision must be made for the improvement and enforcement of building and development codes. The

development of sewerage and waste disposal facilities needs to be given a very high priority with the implication that programmes with a lower priority should be displaced or postponed. Discriminatory taxation, which may serve to discourage urbanization of coastal areas, may prove difficult to administer and raises questions of equity.

Regulations already exist to prohibit destructive practices such as the dynamiting of fish, the removal of coral, traffic in endangered species and the over-fishing of Caribbean fishing stocks. Governments must cost improvements in the administration and policing of these regulations. The same holds for practices of ships and boats using Caribbean marine areas. Their waste disposal practices need to be monitored and regulations for the carriage of hazardous materials should be firmly enforced. Vessels in the Caribbean area should observe internationally accepted standards of safety. Improved enforcement will require additional expenditure.

Increased spending on marine research is a crucial element in protecting the marine environment. Far too little is known about the marine environment on which so much of the Caribbean's economic destiny rests. The research

institutes devoted to marine research are few and pitifully funded. A significant increase in the resources devoted to this area is essential.

Waste Disposal

This is perhaps the most outstanding environmental problem facing the Caribbean. Policies must take account of the reactions of households and firms in industry, tourism and commerce to alternative strategies for reducing waste and improving disposal. Available technology offers limited options for recycling. The volume of waste and its treatment depends on the mix of degradable and non-degradable material, and toxic wastes create a special problem.

The options available include intensified recycling, the upgrade and expansion of waste disposal facilities, incentives to reduce the amount of waste created and to promote greater cleanup by industry, hotels and commerce and improved disposal facilities by households.

Recycling requires finance to meet the cost of expanding such programmes. These costs include sorting, transportation, cleaning and investment in new

processing facilities. An assessment must be made of the opportunities for discriminatory taxation to encourage greater recycling. It may, however, be difficult to administer such taxation. Incentives to encourage recycling through financial transfers may be more effective but they have a high cost in terms of government's budget. Regulations are also costly to administer. A combination of initiatives along these lines should be evaluated in light of their overall impact on the quantity of national waste.

Technical work is required on facilities for waste disposal. It may well be that the most effective techniques are also the most costly. Trajectories have to be established for alternative mechanisms and the best compromise sought between the volume and impact of waste disposal and the cost of the technology.

Measures to ensure that wastes are processed or cleaned before disposal may be induced by a combination of taxation, regulation and subsidies.

Energy Conservation

The options for energy conservation fall into the usual three categories. Regulations may be imposed for standards of energy consumption, on the sellers of goods and appliances for household and firm use. Such regulations might also be applied to imports. Taxation can be used by discriminating in favour of energy efficiency. The simplest policy is to raise taxes on energy use, but this may create some considerations of equity.

Transfers are expensive but they may be used as a reward for energy efficiency. It is possible to assemble a matrix of alternative policies, each with the associated impact and cost, as a guide for recommendations to improve existing circumstances.

A Matrix of Policies

From a process which follows the lines outlined above, it is possible to draw up a policy matrix of environmental improvements. These are not necessarily optimal policies. The search for environmental optima results in arbitrary choices because there are so many unknown factors, differences of expert opinion and difficulties of measurement and comparison. The

practical approach suggested here involves improvements in whatever is the current situation.⁴ In most instances, measures which will improve on the current situation can be identified, together with reasonable estimates of the cost of putting them in place and their effects.

A framework can therefore be drawn up for each country to measure the cost of a comprehensive set of environmental policies. An illustration is given in Table 1; in practice each government would include dollar values in the "cost/revenue" column. A great deal of technical non-economic background analysis has to be done in order to provide the information which goes into the construction of the required policy matrix. The matrix will include a description of the policy measure, the estimated cost to government (or revenue that might be yielded by additional taxation levied by government) and the estimated effects - both the effects on the environment and any side effects, for example on the rate of growth of agriculture, industry or tourism.

Policy decisions might then be addressed by completing the matrix and adding up the net cost of the total package of policies suggested in this first round. If government could find low priority expenditures and projects to substitute for these environmental strategies such that the total government expenditure remains the same, all the policies in the strategy could be implemented. Typically, however, the first round will produce requirements far in excess of what may be accommodated. It will then be necessary to re-examine the matrix and to make compromises so as to reduce the total costs. The implication undoubtedly will be that environmental standards will fall below the improvements desired in many areas. The matrix allows the community to understand why compromises are unavoidable, and to make realistic decisions on priorities and tradeoffs.

This approach fits into the modern budgetting framework adopted in some form by most Caricom countries, where government expenditure budgets are accompanied by a description of the programme to be financed and its justification. With the assistance of an environmental policy matrix specific policies may be incorporated into the budget. Government budgets should be determined within a forward-looking macroeconomic framework, which

incorporates the effects of growth and inflation on government finance, and the impact of government operations on the balance of payments and economic performance. Such models are in use or under development in the Bahamas, Barbados, and the ECCB and Trinidad and Tobago (See Samuel, 1994; Worrell, 1994; Craigwell et al, 1994). They may be extended to incorporate social accounts, to give a more comprehensive picture of the impact of environmental policies, including implications for income distribution (UN, 1994).

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Table 1
p1

Environmental Policy Matrix				
<u>Water Quality</u>	<u>Measure</u>	<u>Cost(-)/Rev.(+)</u>	<u>Effect</u>	<u>Side Effects</u>
	Regulate herbicides, pesticides	Low (-)	Uncertain	Higher costs/agr.
	Regulate &/or tax industri. waste	Low (-)	List major effluents & improvements	Higher costs/ind., comm., tour.
	Improved water distri.	High (-)	Set quantitative target	
	Zoning	Low (-)	No deterioration of status quo	
<u>Coasts</u>	Incentives for better agr.	High to Moderate (-)	Set target for runoff	Higher agr. output
	Zoning	Low (-)	" " "	Higher P/coastal real estate
	National Parks	High (-)	No deterioration	
	Regulation of marine sports	Low (-)	" "	
	Policing of economic zone	High (-)	" "	
	Marine research	High (-)	Iden. magnitude of problems, quantify improvement & deterioration	

236

Table 1 (Cont'd)
p2

Environmental Policy Matrix				
<u>Waste</u>	<u>Measure</u>	<u>Cost(-)/Rev.(+)</u>	<u>Effect</u>	<u>Side Effects</u>
	Sewerage	High (-)	Targets for effluent discharge	
	Recycling incentives	Moderate (-)	Quantitative targets for recyclable materials (% of total waste)	Higher costs
	Waste disposal facility upgrades	High (-)	Quantitative target (vol): % of total. Measures of improvement: energy recovery, reuse, reduction in pollution, land use, etc.	
	Incentives for clean-up of waste	Low to Moderate (-)	Itemise, with targets; % of total waste	Higher costs
<u>Energy</u>	Higher energy Ps	Moderate (+)	Targets for reduced energy/output energy per capita	Higher costs, income distribution?
	Standards for energy efficiency	Low (-)	"	
	Incentives for energy efficiency (transfers)	Moderate to High (-)	"	
<u>Total Cost</u>		High (-)		

Endnotes

1. I suggested this list of priorities in Worrell & Worrell, 1990.
2. The "Programme of Action for the Sustainable Development of Small Island Developing States" adopted at the Barbados Conference in May 1994 identifies the following areas of concern: climate change and sea-level rise; natural and environmental disasters; the management of wastes; coastal and marine resources; fresh water resources; land resources; energy resources; tourism resources and bio-diversity resources.
3. The management of wetlands may be approached by use of cost/benefit analysis (See Bojo, Maler and Unemo, 1992) but there are practical difficulties with the method. One may obtain results to justify any policy to which you are pre-disposed by choice of valuation technique, rate of discount and assumptions about inflation.
4. A concern that over-arching approaches are doomed by inertia is widely shared (See Girvan and Simmons, 1991, p. xx). Several papers in that volume suggest approaches to the measurement of sustainability and carrying capacity and expand on the difficulties of implementing them.

