

Public Environmental Expenditures: A Conceptual Framework

Sheng Fulai

**Macroeconomics for Sustainable Development Program Office (MPO)
World Wide Fund For Nature**

Abstract: *Public spending on environmental protection is often a small fraction of total government budget in developing countries. Such spending is further reduced during the stabilization phase of macroeconomic adjustment. Increased environmental awareness calls for proper treatment of such spending, particularly during periods of financial difficulty. But international financial and development institutions that advise governments on macroeconomic adjustment still do not have specific guidelines on public environmental expenditures. Conventional criterion on public expenditures focus on economic efficiency and macroeconomic stability, but fail to incorporate environmental and social factors which are important not only for the improvement in the quality of life, but also for achieving genuine efficiency and stability. This paper goes beyond the conventional approach and develops a framework which may help highlight the issue of public spending on the environment in discussions of fiscal policies. An immediate objective of this paper is to provide a means for international financial and development institutions, as well as national budgetary agencies, to monitor public spending on the environment.*

1. Introduction

This paper develops an analytical framework for decisions on public environmental expenditures (PEEs), i.e. those parts of government spending that are designated for achieving environmental objectives.¹ The need for such a framework stems from concerns over observed reductions of PEEs in countries implementing macroeconomic reform programs. Such reductions are found to have contributed to environmental deterioration. In Zambia, for example, public spending reductions have weakened national parks administration and facilitated the acceleration of wildlife loss during the period of structural adjustment.²

Although the importance of environmental protection is generally recognized, when it comes to government spending, the environment often receives little priority. In times of financial difficulties, the environment is often treated as a soft sector more vulnerable to being cut. That the environment is so treated may be explained in at least three ways.

1. Environmental priorities and goals have not been clearly defined in many countries.
2. There has been no agreed international classification of environmental expenditures.

¹Expenditures are defined as “the values of the amounts that buyers pay, or agree to pay, to sellers in exchange for goods and services that sellers provide to them or other institutional units designated by the buyers.” UN (1993b:207).

²Reed, ed. (1996:134).

3. The costs and benefits of environmental protection programs often defy quantification and monetization, making it difficult to justify these programs on conventional economic criteria.
4. Many developing countries are faced with serious financial difficulties, which constrain their ability to spend on the environment.

In short, there is no analytical framework that helps bring PEEs into the core of government spending considerations.

This paper is intended to help fill that gap. Its target audience is international and national institutions that have influence over the level and composition of public expenditures. The objective is to help secure a minimal level of PEEs for the provision of public environmental goods and services, particularly in countries that are experiencing financial difficulties and going through macroeconomic reforms. An immediate objective is to provide a means for international financial and development institutions, as well as national budgetary agencies, to monitor public spending on the environment.

The main body of the paper consists of four sections. Following this introduction, Section 2 discusses identification of national environmental priorities and establishment of an environmental indicators system as a first step toward the construction of an analytical framework. Section 3 introduces a few classification models of environmental expenditures and links such a model to an environmental indicators system. Section 4 considers criteria for making decisions on PEEs. Section 5 explores sources of funding for PEEs. The concluding section summarizes major points of the paper.

2. Environmental Priorities and Indicators

Environmental priorities must be identified as a first step toward rational decisions on PEEs. If societies and governments are serious about addressing environmental problems, priorities must be set and ranked so that limited resources can be channeled toward solutions to the most acute problems. The identification of priorities is particularly needed in times of financial difficulty in order to shield the most important environmental objectives from disinvestment.

To establish environmental priorities, we must do two things. One is to review existing baseline data and indicators to understand the scope, magnitude, and implications of various environmental issues. The other is to analyze people's identification of environmental problems. The latter is necessary because existing data and indicators may be inadequate to cover the spectrum of environmental problems.

Ideally, the identification and ranking of environmental priorities should be a social process. Environmental priorities, once established, require the society as a whole to make sacrifices in terms of foregoing financial resources for other objectives. Social consensus is

necessary to help ensure citizens' support for environmental policies. The consensus may be reached by making baseline data and indicators widely available to the public to facilitate open debates and to elicit public perceptions of environmental problems. Experts in various environmental fields, environmental NGOs, the media, and other organized groups could play a role in interpreting the implications of various environmental problems in the context of, and in relation to, social and economic crises prevailing in many countries.

In practice, however, such a social process is not likely to happen, particularly in times of social and economic crises. The ideal process assumes the availability of basic data and indicators, which are non-existent in many countries. It also assumes the existence of organized social groups which, in reality, are often politically weak or lack the ability to address many policy issues facing governments. Moreover, social and economic crises tend to focus national attention on short-term issues. Although the social process for prioritizing environmental problems is fundamentally important, alternative approaches are needed to take into account specific country circumstances.

An alternative approach is based on national sustainable development strategies and national environmental protection programs, which have been or are being developed in most countries as part of government commitments to Agenda 21. Such strategies and programs often include priority environmental issues. A list of the priorities specific to individual countries can be compiled. Figure 1 provides an example of such a list, largely reflecting the priorities of industrialized countries.

Figure 1. Environmental Priorities in the U.K

- | |
|---|
| <ol style="list-style-type: none">1. Pollution Abatement2. Environmental Conservation3. Research and Development4. Education and Training5. General Administration6. Profitable Waste Recycling7. Management of Natural Resources8. Improvement of Amenities |
|---|

Source: Ecotec (1993:vii)

Another approach is to use a common and broad international list which can facilitate international comparison. Such an international list should cover a wide range of issues within which national priorities can be located. Countries could use such a list as a reference, but focus their data collection and indicator selection efforts on their respective environmental priorities. The World Bank has developed such a list (see Figure 2), classified by four major attributes describing the human-environment interactions: sources, sinks, life support, and human health impacts. Most issues listed under these four categories are priorities in Agenda 21.¹

¹World Bank (1995:76).

Figure 2. List of Priority Environmental Issues

<p>I. Sources</p> <ol style="list-style-type: none"> 1. Water (excluding oceans) 2. Fisheries 3. Forests 4. Land <ul style="list-style-type: none"> land management agriculture & rural development deserts & droughts 5. Sub-soil assets
<p>II. Sinks</p> <ol style="list-style-type: none"> 1. Solid waste 2. Toxics 3. Green House Gases 4. Stratospheric ozone
<p>III. Life support</p> <ol style="list-style-type: none"> 1. Biodiversity 2. Oceans & coastal zones
<p>IV. Human health impact</p> <ol style="list-style-type: none"> 1. Water quality & access 2. Air quality

Source: World Bank (1995:76).

The identification of priorities should closely linked to the development of environmental indicators. Even in the suggested social process of prioritization, baseline data and indicators should already be employed. When priorities are set, existing data and indicators need to be sifted, their quality improved, new data collected, and indicators compiled along established priority issues to serve the following purposes:

1. detecting environmental trends
2. communicating to policymakers and the public
3. setting and adjusting environmental targets
4. guiding environmental and economic policy
5. directing PEEs
6. evaluating the effectiveness of policy and PEEs

Goal-setting (including the time period within which goals are to be reached) should be part of these two processes: identification of priorities and development of indicators. This is to give substance to identified environmental priorities. When setting environmental goals, we must take into account other social and economic imperatives, trade-offs through a general equilibrium analysis, and the general financial strength of a country so as to produce a balanced composition of the overall public expenditures. As environmental, social, and economic situations evolve, environmental priorities and goals need to be reviewed and adjusted.

The most influential system of environmental indicators is OECD's Pressure-State-Response (PSR). It is used as the basis for the World Bank's System of Sustainability Indicators as well as for the indicators framework of the United Nations Commission on

Sustainable Development (CSD).¹ The PSR system is built upon the logic that human activities exert “pressure” on the “state” of the environment and changes in the state of the environment elicit “responses” (including both policy measures and target-setting) to solve environmental problems. For illustration, Figure 3 represents the World Bank's environmental indicators matrix (part of the Bank's sustainability matrix based on OECD's PSR model) in a slightly adapted form.²

Two points must be made regarding the PSR model. One is that the pressure indicators often indicate, exclusively, direct and immediate human causes of environmental problems. Such causes are not the whole picture. There are complex social and economic factors that give rise to environmentally damaging behaviors. For example, the problem of desertification (state) may be directly driven by fuelwood consumption (pressure), but behind fuelwood consumption there can be a wide range of factors including poverty, substitution possibilities, energy prices, etc. which explain the way in which fuelwood is consumed. When environmental policies are designed, therefore, one should go beyond immediate human pressures and explore social and economic root causes.

The other point is that environmental targets should be made explicit in the system of indicators. In their present formulation, the response indicators include both policy measures and environmental targets. For example, for the issue of stratospheric ozone, the response indicator is "programs to phase out ozone-depleting substances" (policy measure), whereas for the issue of forests, the response indicator is "reforestation rate" (target). For the purpose of assessing the effectiveness of policy and environmental expenditures, target indicators should be highlighted in the system. It is suggested that response indicators be changed into goal indicators or that response indicators be confined to policy measures with a separate column for goal indicators.

Having identified environmental priorities and established a system of environmental indicators, we should then relate PEEs to the priorities and indicators. Such a linkage will enable us to target PEEs to specific environmental problems, justify the relative weights given to various priority issues, and assess the effectiveness of PEEs in achieving established environmental goals. When compared with environmental expenditures by other sectors (industry, households, non-profit organizations), we could also understand the roles of different actors in addressing environmental problems. But before we make such a linkage, let us first clarify the concept of environmental expenditures and review some of the classifications of environmental expenditures.

¹World Bank (1995) and UNCLAD (1995).

²World Bank (1995:76).

Figure 3. Environmental Indicators Matrix

Issues	Pressure	State	Response
I. Sources			
1. Water (excluding oceans)	Withdrawal/availability	Water use /population	Water charges/costs of provision
2. Fisheries	Catches of marine species
3. Forests	Roundwood production Deforestation rate	Forest area/total area Standing timber	Reforestation rate Stumpage fees/price of timber
4. Land land management agriculture & rural development deserts & droughts	Land use changes arable land per capita use of fertilizers & pesticides fuelwood consumed per capita	Human-induced soil degradation cropland/natural capital area with salinization or water logging desertification index	Land management techniques rural to urban terms of trade expenditures on extensions ...
5. Sub-soil assets	Material inputs/GNP Extraction rates Energy consumption per capita	Sub-soil assets/wealth Years of proven reserves ...	Prices of inputs to outputs Energy taxes & subsidies Renewables/non-renewables
II. Sinks			
1. Solid waste	Industrial & municipal waste	Waste disposal/waste generation	Expenditures on waste collection
2. Toxics	Generation of toxics	Area of contaminated land	...
3. Green House Gases	CO ₂ & methane emission	CO ₂ & methane in atmosphere	Expenditures on abatement
4. Stratospheric ozone	Production of CFCs	CFCs in atmosphere	Programs to phase out ozone-depleting substances
III. Life support			
1. Biodiversity	Rate of habitat loss Rate of species extinction	Natural capital/wealth Number of threatened species	Protected area/total land area Protected areas/sensitive areas
2. Oceans & coastal zones
IV. Human health impact			
1. water quality & access	Household water use per capita	Access to safe water	% of population w/sanitation
2. Air quality	Pollution load	Ambient concentration	
3. Other			

Note: Certain indicators have yet to be developed. They are denoted by "...".

Source: World Bank (1995:76).

3. Classifications of Environmental Expenditures

This section explains the concept of environmental expenditures and provides examples of their classifications. The purpose is not to engage in a technical discussion of measuring problems which can be found elsewhere.¹ Rather, the aim is to facilitate the construction of a basic PEEs classification system that can be related to environmental indicators.

There are different definitions of environmental expenditures. In the UK, for example, environmental expenditure is defined as "capital and operating expenditure incurred by government, industry, households and other organizations, which can be clearly identified and explicitly attributed to directly improving and maintaining the quality of the environment."² The UK, for domestic purposes (rather than for international comparison), classifies its environmental expenditures by module/actor and module/medium as illustrated in Figures 4 and 5, respectively.

Figure 4. Classification of UK Environmental Expenditures by Module and Actor.

Module	Government	Enterprise	Households	NGOs	Total
I. Pollution Abatement					
II. Environmental Conservation					
III. Research and Development					
IV. Education and Training					
V. General Administration					
VI. Profitable Waste Recycling					
VII. Mgt. of Natural Resources					
VIII. Improvement of Amenities					
All Modules					

Source: Ecotec (1993:vii).

Figure 5. Classification of UK Environmental Expenditures by Module and Medium.

Modules	Waste	Air	Water	Noise	Land	Other	Total
I. Pollution Abatement							
II. Environmental Conservation							
III. Research and Development							
IV. Education and Training							
V. General Administration							
VI. Profitable Waste Recycling							
VII. Mgt. of Natural Resources							
VIII. Improvement of Amenities							
Total							

Source: Ecotec (1993:viii).

Environmental protection expenditures are sometimes expressed in the concept of "defensive expenditures", originally defined as "expenditures to cure and mitigate, or to

¹Eurostat (1994a and 1994b).

²Ecotec (1993:iii).

anticipate and prevent the damages the economic process in industrial societies caused, or causes, to the environment and living conditions in general."¹

The United Nations does not have an explicit definition of environmental expenditures, but its definition of defensive expenditures or costs are "the actual environmental protection costs involved in preventing or neutralizing a decrease in environmental quality, as well as the actual expenditures that are necessary to compensate for or repair the negative impacts of an actually deteriorated environment."² It uses a draft Classification of Environmental Protection Activities (CEPA) to which the purposes of expenditures can be related. Defensive expenditures are not deducted from net value added under the System of Integrated Environmental and Economic Accounting (SEEA) due to difficulties in isolating those expenditures that are driven by efficiency considerations from those driven by purely environmental considerations. The major categories of these expenditures are presented in Figure 6.³

Figure 6. UN Draft Classification of Environmental Expenditures.

- | |
|---|
| <ol style="list-style-type: none">1. Protection of ambient air and climate2. Protection of ambient water (excluding ground water)3. Prevention, collection, transport, treatment and disposal of wastes4. Recycling of wastes and other residuals5. Protection of soil and ground water6. Noise abatement7. Protection of nature and landscape8. Other environmental protection measures9. Research and development |
|---|

Source: UN (1993: 159-160).

The establishment of such a classification system does several things. It helps disaggregate environmental expenditure data in the existing national accounts and identifies data gaps. Environmental expenditure data classified on the basis of such a system provides information for developing specific environmental policies. It indicates current environmental priorities, the costs of moving toward established environmental targets and cost-sharing between the government, industry, households, and the non-profit organizations, the effectiveness of environmental expenditures, and the demand for environmental goods and services.⁴ The data gaps thus identified help direct future data collection efforts.

An international classification system, such as the draft system used by the UN, is useful for moving toward cross-country comparison, but like the international list of priority environmental issues, such a system should be broad enough to cover environmental conditions in both developed and developing countries. In developed countries, the major

¹Leipert and Simonis (1991:213)

²UN (1993a:5).

³UN (1993a:159-160).

⁴Ecotec (1993:8) and OECD (1993:9).

concern is environmental degradation whereas in most developing countries natural resource depletion poses a greater threat. The UN draft system is recognized as being based mainly on developed countries' conditions and priorities.¹ The depletion problem needs to be reflected more visibly in an international framework. Moreover, environment-related health problems, which have reached an alarming level in many developing countries, should also be explicitly included in such a system.

A flexible way of classifying environmental expenditures is to link the classification to a broad system of environmental indicators such as the one developed by the World Bank (see Figure 3). This requires expenditures to be classified according to the issues identified in the system of indicators. Countries still have the option of focusing on parts of the system to suit their domestic needs while the common international framework facilitates international reporting and cross-country comparison. To illustrate, a combination of an indicators system and a framework of expenditures classification is provided in Figure 7. This framework has several characteristics.

- Environmental goals are explicitly listed, enabling the assessment of progress.
- Response indicators, confined to policy measures (i.e. not including goals) in this framework, could still be included (mostly in qualitative terms).
- "Protection" under expenditures covers resource conservation, pollution abatement, and other measures of environmental protection such as recycling.
- Certain environmental nuisance, such as noise, could be included under "human health impact".
- R & D, Education and Training, and Administration can be either contained in expenditures of each sector or expressed as a total sum for all sectors or both.
- Expenditure data in this framework can easily be adapted to fit into other expenditure classification systems. For example, expenditure data on Green House Gases (GHG), stratospheric ozone, and air quality put together could be the equivalent of "protection of ambient air and climate" in the UN draft classification.

When the link between priority environmental issues, goals, and the expenditure classification is established, data on relevant environmental expenditures should be collected. We can use the data to assess existing spending priorities in the environmental sector and check whether the existing level and composition of such expenditures is consistent with the newly established priorities and goals.

¹ UN (1993a:45).

4. Criteria for PEEs

The previous sections have answered the question of what types of environmental protection activities are to be financially supported by the society as a whole. This and the next sections will answer the questions of what the government is to spend on, how much to spend, and where the funding comes from. The first question relates to the respective roles of the government, industry, households, and non-profit organizations. The question of how much to spend has to do with the financial constraint of the public sector as well as the scope for new financing. And the question of where the funding comes from has to do with existing expenditures, tax base, cost recovery, private provision, new sources of revenue or, in general, fiscal reforms.

This section answers the first of these questions under three sub-headings: efficiency criteria, sustainability criteria, and major items for PEEs. The questions of how much to spend and where the funding comes from will be answered in the next section “Sources of Funding”.

Efficiency criteria

There are three conventional criteria for public expenditures: assignment efficiency, allocative efficiency, and productivity efficiency. Based on these criteria, government spending in the environmental sector as well as in any other sector should generally focus on public goods where the market fails, leaving the rest to the private sector (i.e. assignment efficiency). It is asserted that “state intervention is justified only when markets fail”¹. In addition, government spending must satisfy the criteria of being able to meet its designated objectives (allocative efficiency) and to produce at minimum cost. (productive efficiency). The cost-benefit test which is applied at the project selection level is assumed to be embodied in these criteria.²

These efficiency criteria can be accepted in general, but in their practical application, there is often a bias against public intervention in favor of the private sector. First, there is an underestimation of the prevalence of market failure in the economy, particularly with regard to the environment. Second, there is an exclusion of a society’s environmental and social preferences from market prices. Third, there is inadequate recognition that the public sector can be placed in a competitive market situation and be expected to produce at minimum cost.³ Finally, the conventional cost-benefit test tends to disqualify many environmental programs.

¹World Bank (1996b:110).

² IMF (1996:4).

³ See Hemming and Miranda (1991b).

Figure 7. Linking Environmental Expenditures to Environmental Indicators.

Issues	Indicators				Environmental Expenditures				
	Pressure	State	Response	Goal	Protection	R & D	Education & training	Admin	Total
1. Water & ground water (excluding oceans)									
2. Fisheries									
3. Forests									
4. Land/soil									
5. Agriculture & rural development									
6. Deserts & droughts									
7. Sub-soil assets									
8. Solid waste									
9. Toxics									
10. Stratospheric ozone									
11. Biodiversity									
12. Ocean & coastal zones									
13. Water quality									
14. Air quality									
15. Other									
Total									

Source: author's analysis.

The efficiency criteria, themselves not incorrect, must therefore be applied with a broadened view of efficiency. With regard to the assignment efficiency, government intervention in the environmental sector should be strengthened, as “the environment is a classic public good.”¹ With regard to the allocative efficiency, market prices should not be seen as expressions of a social welfare function; rather, environmental programs based on socially defined priorities and objectives should be pursued. With regard to the productivity efficiency, “where markets fail, a case-by-case judgment is needed on whether government provision - or the regulation or funding of private provision - can do better”.² With regard to cost-benefit analysis, to the extent possible, economic values of the environment should be estimated using available techniques and included in the calculation; such values should be complemented with qualitative analysis including environmental impact assessment.

Apart from these micro-level efficiency criteria, there are also a macroeconomic criteria (macroeconomic efficiency): public expenditures in general should be consistent with basic macroeconomic objectives - low inflation, internal and external balance, and growth. Recent analysis also adds other policy objectives to this criteria: equitable distribution of income, poverty alleviation, and “perhaps, even, environmental protection”.³ In the following discussion, we focus on the implications of this criterion for PEEs.

This criterion makes sense since economic instability, which may result from an overblown public budget, is bad not only for the economy but also for society and the environment. Recent analysis broadens the view of macroeconomic policy by including environmental and social objectives. Indeed, genuine growth is indispensable from a solid environmental base and a stable society. Expenditures or ways of funding expenditures that lead to the weakening of the environmental and social basis of growth and macro-balance must, therefore, be discouraged whereas those that enhance the potential of growth and macro-balance must be encouraged.

Sustainability criteria

The additional elements in the macroeconomic criteria, however, could be presented more explicitly from two perspectives. From a purely economic perspective, “growth is explained in terms of changes in physical capital, human capital, technology, and efficiency in resource use.”⁴ PEEs, therefore, must be maintained and enhanced where environmental deterioration seriously affects human health. This is to protect the human capital ingredient of growth. Moreover, PEEs must be maintained where there is a high likelihood of ecological irreversibility.⁵ This is to protect the fundamental basis or physical

¹ Hemming (1991c:175).

² World Bank (1996b:111).

³ IMF (1996:4).

⁴ Hemming (1991a:16).

⁵ Hemming and Mackenzie (1991:8).

capital for all economic activities in the future even though such irreversibility may not pose immediate threats to macroeconomic objectives.

From the perspective of sustainable development or quality of human life, three dimensions could be considered: economic, ecological, and social (human). From this perspective, the economic criteria could focus on the maintenance of a constant stream of income (economic or income sustainability) whereas human health (particularly the health of the poor who suffer most from environmental deterioration) and life support functions of the environment should be protected in their own right, apart from economic reasons. Based on this sustainability perspective, it is logical to highlight the environmental and social elements in the macro-level criteria for PEEs. We could, therefore, list out both micro-level efficiency criteria and macro-level sustainability criteria as follows:

Figure 8. Efficiency and Sustainability Criteria for PEEs.

<p>Efficiency Criteria</p> <ol style="list-style-type: none"> 1. assignment efficiency (public or. private sector) 2. allocative efficiency (effectiveness in reaching targets) 3. productivity efficiency (least cost) <p>(environmental values to be estimated and included in cost-benefit test where possible and meaningful, complemented with qualitative assessment)</p> <p>Sustainability Criteria</p> <ol style="list-style-type: none"> 1. Macroeconomic sustainability (low inflation, fiscal/BOP balance, growth, including natural capital) 2. Social sustainability (environment-related human health impacts, particularly the poor) 3. Ecological sustainability (life support functions)

Source: author's analysis.

There may be a conflict, however, between the objective of avoiding deficit financing (or other destabilizing financing) and the objective of maintaining or enhancing productive expenditures. Some possible solutions to this paradox are discussed in Section 5 on sources of funds. Given that destabilizing ways of financing are bad not only for the economy but for the environment and society as well, it suffices to say here that environmental and social objectives must not be achieved at the expense of fiscal prudence; that would create a vicious cycle. Productive expenditures should be maintained or enhanced through restructuring the existing level and composition of expenditures and through exploration of non-destabilizing sources of funds.

The context in which these criteria are proposed requires a word of clarification. The ecological sustainability criteria as proposed here are applicable in times of financial difficulties. The question of ecological sustainability is more than irreversibility. Non-threatening or less threatening environmental issues, such as environmental amenities, noise, and odor also have legitimate claims on public finance. Where the financial situation permits, PEEs should cover those issues depending on national priorities. Similarly, the social sustainability criteria is applied with reference to the human impacts of

environmental problems only; it does not imply that PEEs on environment-related social expenditures can replace other social expenditures that are critical to sustainability (such as spending for equity and poverty reduction).

Major items for PEEs

The criteria discussed above provide general guidance for decisions on PEEs in times of financial difficulties; but what types of activities within established priorities should PEEs focus on? The answer to this question depends on specific country conditions. General suggestions, however, are available. PEEs are usually divided into two categories: capital expenditure and current expenditure (operation and maintenance or O/M). In general, during financial retrenchment, PEEs should focus on O/M of existing environmental infrastructures. The World Bank concludes that “... reducing maintenance spending is a false economy. Such cuts have to be compensated for later by much larger expenditures on rehabilitation or replacement.”¹ Capital spending should be made when existing facilities are seriously lacking and their absence seriously violates the sustainability criteria mentioned above.

The core infrastructures where O/M are badly needed in developing countries are identified by the World Bank as water supply, sanitation, sewage, and solid waste collection/disposal, traffic congestion and pollution related to transport, water logging/salinity related to irrigation, and emissions related to power generation.² The O/M in these areas must be maintained and enhanced. Fiscal retrenchment should aim to increase their efficiency rather than seek to meet narrowly defined macroeconomic objectives at the expense of their O/M.

Within the O/M category, environmental administration should be given special attention. The economies of most developing countries are going through profound transformation toward greater private control of the economy. In the environmental sector where market failures are overwhelming, the role of the public sector in collecting data, disseminating information, setting standards, enforcing regulations, promoting new technology, providing credit, applying economic instruments for the environment, and monitoring progress is crucial particularly in this transformation process. The aim is not to maintain the expenditure level or the number of employees in environmental administration; indeed, there is a large room for efficiency improvement in the whole civil service sector. Rather, the objective should be to improve the effectiveness of environmental administration. This also includes the strengthening of the government’s capacity to control and monitor PEEs and be accountable to the public on such expenditures.

Other components in the O/M category, mainly R&D and education/training, could place relatively less burden on public finance. R & D may have been already contained in respective industrial sectors. Many domestic and international non-profit private

¹World Bank (1994:4).

²World Bank (1994:1).

organizations are also involved in cross-sector and global R&D issues. Moreover, governments can encourage industry to internalize specific R&D activities through regulation. Similarly, education and training is an area where both industry and non-profit organizations can be expected to play a major role. These activities can also be internalized within the industrial sector through regulation. When the fiscal situation permits, governments should consider supporting non-profit organizations in their R&D and education/training activities on cross-sector and global issues.

5. Sources of Funding

The level of PEEs, as well as the level of overall public expenditures, is constrained by the amount of financial resources available to the government. Environmental priorities, goals, and the role of the government in the environmental sector have to be determined within such constraints. In the course of setting environmental goals, for example, the costs of meeting the goals should be determined and compared with the existing and prospective levels of public revenues in order to adjust the goals or the length of time required to reach the goals.

Budgetary constraint should and could be analyzed in a dynamic manner. In macroeconomic reforms, financial constraints are often treated rigidly in the name of respecting financial discipline. Fiscal adjustment tends to affect the expenditures more than revenues without exploring the potential of utilizing fiscal adjustment for the benefit of the environmental sector. This section first discusses the scope of efficiency gains from fiscal adjustment on the expenditure side, then explores the potential to generate new sources of revenue.

Reform of expenditures

When one faces financial difficulties, as a Chinese saying goes, one should “open up new sources while saving on the flows”. Given the existing financial constraints, resources for PEEs can be found from both the expenditure side and revenue side. On the expenditure side, a large amount of resources is wasted in existing programs. Subsidies in energy, transport, agriculture, and timber, for example, are often economically inefficient, socially inequitable, and environmentally destructive.¹ Reduction of such subsidies is often recommended as a way to achieve a “win-win” situation. It can reduce the environmental pressure on PEEs (i.e. environmental situations that necessitate PEEs) on the one hand and yield resources for environmental protection on the other. Where the poor may be negatively affected by the removal of specific subsidies, targeted income support could be used to replace general subsidies which have proved to benefit the rich more often than the poor.

Poverty alleviation is an issue which needs to be addressed in its own right as part of macroeconomic reforms and should be, moreover, a central concern in discussions of the

¹Gupta and others (1995:515).

public budget. However, the close relationship between poverty and the environment calls for an integrated approach to budgetary decisions for achieving the efficiency of public expenditures. A WWF study of macroeconomic reforms in Cote d'Ivoire, Mexico, and Thailand concludes that poverty and environmental deterioration reinforce each other and that government efforts to address poverty (through general subsidies on use of natural resources, for example) have frequently aggravated environmental problems.¹ This has two implications as far as the theme of this paper is concerned: 1) public spending on the environment can contribute to poverty alleviation; 2) public spending on genuine poverty alleviation, i.e. targeted support and equitable distribution of wealth and opportunities as opposed to liquidation of natural assets to attenuate social pressure, can lead to reduced pressure on the environment. Linking environmental protection to poverty alleviation in budgetary decisions, therefore, holds the potential for having positive effects in both areas.

Another area where resources for PEEs can be found from the expenditure side is alterations in the level of existing public expenditures. In developing countries, for example, military spending in the second half of 1980s accounted for 5 per cent of GDP, "more than enough to double government spending on infrastructure or on health and education".² "White elephants" have also contributed to fiscal deficits. Reducing unnecessary or ineffective public projects could yield resources for environmental protection. To change the level of public expenditures on existing programs, however, is no easy matter. It has political implications which deserve a much more substantive treatment. For the purpose of this paper, we would only like to emphasize increased participation of civil society in decisions on budgetary allocations as a way of counterbalancing the influence of vested interests.

Reform of revenues

On the revenue side, resources for PEEs may be found indirectly (in terms of reduced environmental pressure on PEEs) without a general tax increase. In general, it will require a shift in the existing tax structure from heavy tax on labor, income, and capital to increased tax on pollution and use of natural resources while maintaining fiscal neutrality. Environmental taxation and its effective enforcement will generally reduce the pressure on the environment, and consequently, the required level of PEEs. The design of specific tax reform programs, however, should consider society-wide implications, particularly the implications for the disadvantaged groups of society, to ensure that new tax systems will actually reduce the pressure on the environment rather than the other way round, as might be the case if new systems further aggravate social inequity.

The suggested tax reform, however, must take into account specific circumstances in developing countries. In many of these countries, taxation systems are often ineffective and, moreover, financial and current account imbalances often have been excessive and contributed to social unrest. These complications require an enabling environment for the

¹ Reed, ed (1992:154-157).

²World Bank (1991:142).

tax reform. Accordingly, the question of environmental taxation should be set in the context of overall economic, budgetary, and institutional restructuring. Required changes on the expenditure side have been discussed earlier in this section. On the revenue side, three measures can be considered. The first is to improve the equity and effectiveness of existing taxation systems. This can contribute to the mediation of social discontent. The second is to expand the tax base through a growth strategy that is compatible with sustainable development. For example, a growth strategy with poverty reduction as a major objective could help formalize the informal economy and hence expand the tax base. The third is to enhance the capacity of governments to enforce tax rules and prevent tax evasion, particularly by the elite. The fourth, which relates to environmental taxation, is to focus the overall tax reform on reducing the incentives for wasteful use of natural assets and encouraging investment, particularly by the poor, in these assets and in the poor themselves.

To look at financial constraints in a dynamic manner, we could explore the potential for new sources of revenue. One approach is to levy additional environmental taxation (beyond tax neutrality) and to formulate environmental regulations and incentives that encourage private provision of environmental goods and services. This arrangement could further reduce the pressure on the environment and consequently PEEs. At the same time, it provides a source of revenue that can be earmarked for identified environmental priorities. Although the issue of earmarking can be controversial, given the already very low level of PEEs in most developing countries and the vulnerability of the environmental sector to budgetary cuts, it may make sense to earmark at least some of the revenues from environmental taxation for environmental protection and for poverty alleviation programs that may directly relieve the pressure on the environment.¹

A related approach is partnership between communities and the government. Where the beneficiaries of an environmental program can be identified, there is a potential for contributions (in terms of both funds and labor) from the relevant communities with the government acting as a co-financier or credit provider if necessary. This not only would reduce the pressure on the public budget, but also enhance the sense of community ownership of the program. Similarly, depending on cost-effectiveness, environmental infrastructure projects could be partly financed and fully implemented by the private sector in a competitive manner, with public funding to cover positive externalities.

It should be noted that measures to improve overall government revenue (which could benefit PEEs indirectly) must observe the same sustainability criteria for PEEs. A combination of macroeconomic measures (fiscal and monetary policy, currency devaluation, trade liberalization, privatization, etc.) is often needed for such revenue improvement and their broader macroeconomic implications are beyond the scope of this paper. But these measures should not be designed and implemented at the expense of the environment. If trade liberalization, for example, which aims to generate export revenues,

¹Hemming and Miranda (1991a: 149-150).

creates unacceptable risks of irreversible environmental damages or serious human health effects, it would defeat the very purpose which PEEs attempt to achieve.

6. Summary

This paper has suggested 6 major steps in constructing an analytical framework for PEEs. First, identify national environmental priorities. Second, develop a system of environmental indicators, including indicators of goals. Third, link priorities and indicators to the classification of environmental expenditures. Fourth, apply both micro-level efficiency criteria and macro-level sustainability criteria to decisions on PEEs. Fifth, focus PEEs on O/M, in particular on existing environmental infrastructure and on environmental administration. Sixth, reduce waste in existing public expenditures, link PEEs to poverty alleviation, and explore new sources of funding.

Bibliography

Chu, K. and Hemming, R., eds. (1991), *Public Expenditure Handbook: A guide to Public Policy in Developing Countries*, IMF, Washington, DC.

Ecotec Research and Consulting Ltd (1993), *A Review of UK Environmental Expenditure: A Final Report to the Department of Environment*, London: HMSO.

Eurostat (1994a), *SERIEE 1994 Version*, 8E, Luxembourg.

Eurostat (1994b), *Environmental Protection Expenditures: Data Collection Methods in the Public Sector and Industry*, Luxembourg.

Eurostat (1996), *Nordic Natural Resource and Environmental Accounting: Physical accounts for forest resources, marine resources, nutrients and environmental protection expenditures and experiences in Finland, Norway and Sweden of linking physical and monetary accounting and economic valuation studies - A Joint Report from the Statistical Offices in Finland, Norway, Sweden, Denmark, and Iceland*, Luxembourg.

Gandhi, V.P. ed. (1996), *Macroeconomics and the Environment*, IMF, Washington, DC.

Gupta, S. and others (1995), "Public Expenditure Policy and the Environment: A Review and Synthesis", in *World Development*, Vol. 23, No. 3, pp.515-528.

Hammond, A. and others (1995), *Environmental Indicators: A Systematic Approach to Measuring and Reporting on Environmental Policy Performance in the Context of Sustainable Development*, World Resources Institute (WRI), Washington, DC.

Heller, P.S. (1991), "Operations and Maintenance", in Chu and Hemming, eds. (1991).

Hemming, R. and Miranda, K. (1991a), "Pricing and Cost Recovery" in Chu and Hemming, eds. (1991).

Hemming, R. and Miranda, K. (1991b), "Privatization" in Chu and Hemming, eds. (1991).

Hemming, R. and Miranda, K. (1991c), "Public Expenditure and the Environment" in Chu and Hemming, eds. (1991).

Hemming, R. (1991a), "Public Expenditure, Stabilization, and Structural Adjustment" in Chu and Hemming, eds. (1991).

Hemming, R. (1991b), "Public Expenditure and Resource Allocation" in Chu and Hemming, eds. (1991).

Hemming, R. (1991c), "Public Expenditure Measurement" in Chu and Hemming, eds. (1991).

Hemming, R. and Mackenzie, G.A. (1991), "Public Expenditure and Sustainable Fiscal Policy" in Chu and Hemming, eds. (1991).

Hemming, R. and others (1991), "Public Expenditure Productivity" in Chu and Hemming, eds. (1991).

IMF (1996), *Identifying Environmental Expenditures: Theoretical Difficulties and Programmatic Selection Criteria*, (draft), Washington, DC.

Lacroix, A. (1994), *Environmental Spending and Government Accounting*, Statistics Canada, Ottawa.

Leipert, C. and Simonis, U.E. (1991), "Environmental Damage - Environmental Expenditure 2: Statistical Evidence on the Federal Republic of Germany", in *The Environmentalist*, Vol. 11, No. 3, pp.213-216.

OECD (1991), *Environmental Indicators: A Preliminary Set*, Paris.

OECD (1993), *Environmental Monographs, No. 75, Pollution Abatement and Control Expenditure in OECD Countries*, OECD/GD(93)91, Paris.

Reed, D. ed. (1992), *Structural Adjustment and the Environment*, Westview Press, Colorado.

Reed, D. ed. (1996), *Structural Adjustment, the Environment, and Sustainable Development*, Earthscan, London.

Sheng, F. (1995), *Real Value for Nature: An Overview of Global Efforts to Achieve True Measures of Economic Progress*, WWF-International, Gland.

UN (1993a), *Integrated Environmental and Economic Accounting*, New York.

UN (1993b), *System of National Accounts*, New York.

UN Commission on Sustainable Development (1995), *Report of the Expert Group Meeting on Indicators for Sustainable Development*, 14-15 February, New York.

World Bank (1991), *World Development Report 1991: The Challenge of Development*, Washington, DC.

World Bank (1992), *World Development Report 1992: Development and the Environment*, Washington, DC.

World Bank (1994), *World Development Report 1994: Infrastructure for Development*, Washington, DC.

World Bank (1995), *Monitoring Environmental Progress: A Report on Work in Progress*, Environmental Sustainable Department, Washington, DC.

World Bank (1996a), *Environmental Performance Indicators: A First Edition Note*, Environment Department, Washington, DC.

World Bank (1996b), *World Development Report 1996: From Plan to Market*, Washington, DC.