

# Environmental Taxation

## Introduction

The integration of environmental concerns into economic growth and development policies has emerged since the 1970s. During the 1970s and 1980s, environmental policies in many industrialised countries were based primarily on a system of regulations. During this period, however, it became increasingly evident that such regulatory environmental policies have little success in addressing new environmental pressures which demanded a shift in environmental policy and a search of new economic instruments.

Since the early 1990s, many European countries initiated widespread use of economic instruments in controlling pollution. Apart from the increasing levels of pollution, the political reform process that was driven with the aim of becoming more effective and efficient has led to the widespread adoption of economic instruments. Environmental taxes can guarantee that efficiency objectives are achieved with least costs. The tax provides a price signal to consumers and producers to change their behaviour.

## Rationale for Environmental Taxes

An environmental tax is defined as: "any compulsory, unrequited payment to government, levied on tax-bases deemed to be of particular environmental relevance", where the tax bases include energy products, motor vehicles, wastes, measured or estimated emissions, natural resources, etc. (OECD, 2006).

Conventional command and control instruments impose mandatory restrictions on the behaviour of polluting industries and individuals. However, environmental taxes incentivise individuals or industries to change their behaviour. Pollutants are by-products in the production of intended final output. The quantities and types of pollutants depend on many factors (such as type and quantity of goods, technology and inputs used), and taxes could be applied on any of such factors. The level of the environmental tax should reflect the cost of the environmental externality it intends to address (Pigou, 1932; Baumol, 1972).

A tax can alter a producer's pollution control strategy. Figure 1 shows the marginal cost (MC) and marginal benefits (MB) of pollution control.

Marginal cost curve is upward sloping since each incremental unit of pollution control costs more and more to achieve the next incremental level of environmental quality. Marginal benefit curve is

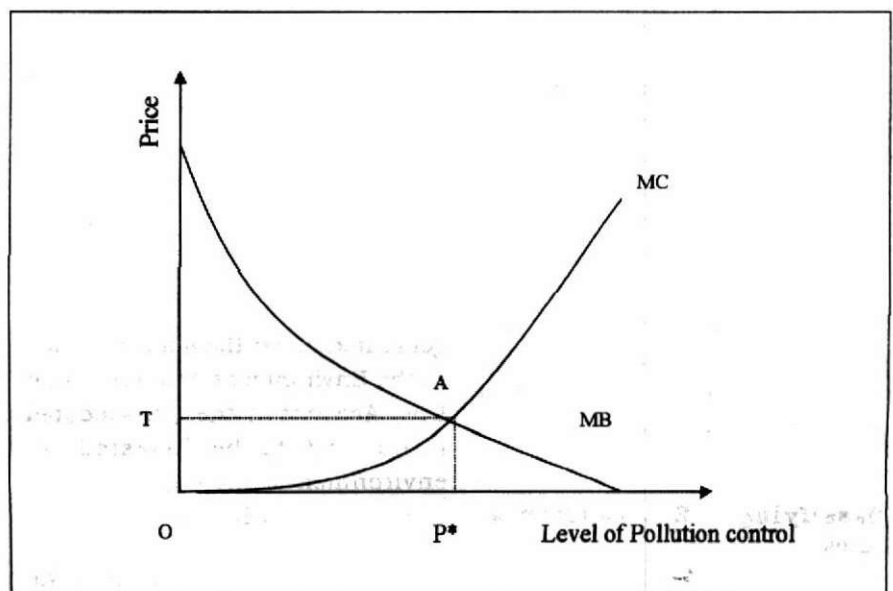
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downward sloping since each incremental unit of control provides fewer and fewer incremental benefits to the society. The socially optimal level of control is where the marginal cost equals the marginal benefit of control (point A). Usually, the producer has no incentive to invest in this optimal level of control since he is able to earn higher profits by setting the level of pollution control at zero. The producer's behaviour could be changed by imposing a pollution tax (a constant rate per unit emission)  $T = MB = MC$ .

Now the producer has two options:

1. to invest in pollution control where the total control cost is equal to area of OAP\*
2. to pay the tax, where the total payment is equal to OTAP\*



**Figure 1: Socially optimal level of pollution control**

Up to the point A, it is more profitable for the producer to invest in pollution control than to pay the tax. The tax provides the incentive for the producer to increase his level of pollution control until his privately optimal level of control equals the social optimum,  $MC = MB$ . Such optimal taxes are known as Pigovian taxes (Hanley *et al.*, 1997). The environmental tax 'internalises the externality' by inducing the pollution generator to behave as if pollution costs entered its private cost functions (Perman *et al.*, 2003).

There are several advantages of environmental taxes. Environmental taxes induce innovation among producers, since it pays them to develop new products and processes to reduce their tax liability, thus resulting economic as well as environmental benefits. The revenues from taxes can be used for either to improve the environment or to reduce other taxes or to correct undesirable distributional effects.

However, in practice, valuing complex environmental effects is quite difficult, and therefore, the estimation of marginal benefits of pollution control (or damage functions) and calculating the optimal tax levels also have been daunting tasks (Baumol, 1972). Alternative approaches, therefore, have been proposed which involves choosing environmental standards on the basis of their effects on environmental or human health, and then to bring levels of environmental damage down to the standards using environmental taxes on an iterative basis. Such environmental taxation could achieve the desired environmental improvement at minimum cost to the society (Ekins, 2009).

### **Classifying Environmental Taxes**

There are different types of taxes; taxes that recover costs, incentive

taxes and revenue-raising taxes. The level of a *cost-recovering tax* is determined by the service it is intended to deliver (for example treating the waste water) or the other purposes to which its revenues will be put (for example, general water treatment). *Incentive taxes* are levied purely with the intention of changing environment-damaging behaviour, and without any intention to raise revenues. The level of an incentive tax can be set at the optimal level where the marginal cost and benefit are equal. If it is not possible, tax can be used as an instrument to achieve environmental objectives set according to other criteria (for example, environmental sustainability). *Revenue-raising taxes may, in addition*, yield substantial revenues over and above those required for related environmental regulation. Such revenues may be used to shift the reliance on income. The latter approach is called an environmental or green tax reform (Ekins, 2009; Ekins & Speck, 2008).

### **Environmental Taxation in Sri Lanka**

In managing natural resources, Sri Lankan government complements regulatory approaches with market-based instruments. The first example of environmental taxes in Sri Lanka was introduced through Environmental Conservation Levy Act No. 26 of 2008 which empowers the Minister of Environment and the Minister of Finance and Planning to impose taxes on specific commodities and services provided within Sri Lanka which are likely to have harmful impacts on the environment. The revenue generated under the Act is remitted to the Environmental Conservation Levy Account of the Consolidated Fund and to be invested on environmental management and conservation in Sri Lanka.

According to the provisions of the said Levy Act, environmental conservation levy was imposed on

mobile phones due to the hazardous e-waste generated. The order No.03 of 2008 imposes a levy of 2% calculated on the value of the services supplied and to be supplied by the licensed cellular operators (for the use of a mobile phone) (Gazette of the Democratic Socialist Republic of Sri Lanka No. 1559/10 dated 22.07.2008). It is expected that the revenue generated from this tax has to be invested on e-waste management in the country.

### **Potential Applications of Environmental Taxes in Sri Lanka**

It is possible to apply environmental taxes in many sectors related to environment and natural resources in Sri Lanka. The need for environmental taxation and a review of some studies that could guide environmental taxation in Sri Lanka are given below:

#### **i. Taxes on renewable and non-renewable resources**

**Renewable and non-renewable resource products:** Export taxes are being applied for many renewable and non-renewable resource products; Indonesia taxes palm oil exports; Madagascar applies tax on vanilla, coffee, pepper and cloves; Russia uses export taxes on petroleum, while Brazil imposed a 40% export tax on sugar in 1996. The EU imposed a \$32 per tonne export tax on wheat in 1995 (Suranovic, 2009).

The need for taxing unsustainable resource harvesting is increasingly recognised. It has become evident that the majority of commercially-exploited fish stocks globally is fully exploited or overexploited (FAO, 2007). In addition, majority of fishery resources harvested is not subjected to any scientific monitoring. Flaaten and Schulz, (2010) investigated the applicability of policy instruments to mitigate fishery resource degradation within the framework of a two-sector

general equilibrium model and found that a positive export tax could increase both GDP and the resource stock. The study further confirms that externalities arising from aquaculture including the damage of mangrove forests and the aquatic pollution could also be reduced by an export tax also on such resource goods.

Taxed export of renewable resource goods could lead to higher domestic consumption and income than with free trade. For example, the increased GDP (due to exports) could facilitate the import of substitutes for the good, e.g., cheaper fish in place of expensive fish. This may give a distributional advantage for the poor (Flaaten and Schulz, 2010).

#### **Fisheries and coastal resources:**

Coastal fishery in Sri Lanka accounts for 91 percent of the total fish production and contributes to about 2 percent to the GDP. However, fishery resource is subjected to over exploitation and the coastal fish catch has exceeded the maximum sustainable yield by 1,1,015 tonnes in year 2002 (MENR, 2008).

There are few charges that are operational in the fishery sector in Sri Lanka. The import of fish and other related articles of the fishery sector is subject to an import duty of 10 percent. River sand mining is one of the main reasons for coastal erosion which reduces the supply of sediment that stabilise the shoreline. An administration fee of Rs 50 per m<sup>3</sup> has to be paid for extracting sand.

Implementation of a tax system in the fishery sector has to be done with caution. Additional burden on the existing coastal fishing could lead to a gross reduction of the coastal fishery. Instead, an allocation system would be suitable to control the overexploitation beyond the sustainable capacity. It is proposed to establish a fishing limit for each region or fishing area

on scientific basis at the community level. Any community that exceeds the limit could be charged a fee (MENR, 2008).

#### **Resource extraction (renewable and non-renewable resources):**

In Sri Lanka, non-renewable resources, such as, rock phosphate and dolomite extraction presently requires a royalty payment. A similar scheme could be proposed for the renewable resources such as timber. Although the Geological Survey and Mines Bureau of Sri Lanka leases land for mining of various non-renewable resources, such as, mineral sands, mica, graphite, dolomite, limestone, silica and quartz, the revenues collected are very low. For example in year 2006, this value was about Rs 130 million. It is recommended, therefore, to increase such royalty payments to reflect the true resource costs both to present and future generations and the environmental damages resulting from the extraction operations (MENR, 2008).

#### **ii. Taxing soil erosion**

Soil erosion imposes substantial economic costs to many tropical developing countries in terms of both on-site effects in hilly lands and off-site effects on hydropower generation and irrigated agriculture. Off-site effects are typically externalities to the people who are generating soil erosion. It has been estimated that annual on-site losses range between 0.5 and 1.5% of GDP in countries such as Costa Rica, Malawi, Mali and Mexico (World Bank, 1992). Annual soil erosion-induced costs ranged between US\$ 90–125 per hectare in Sri Lanka and the annual cost is about 1% of GDP (Somaratne, 1998 cited in Bandara *et al.*, 2001).

Bandara *et al.*, (2001) examined the impact of different instruments, such as, tax/subsidy measures on erosive/less erosive crops and land tax on the level of soil erosion using a Computable General

equilibrium model for Sri Lanka. The results indicate that, although such instruments were capable of achieving significant soil erosion abatement, they may result in different impacts on other policy goals such as national income. The importance of taxing soil erosion, however, could not be ignored and the need to study this issue further is emphasised.

#### **iii. Tax on land degradation**

In Sri Lanka, agricultural and industrial activities, such as, tobacco cultivation, gem mining and construction activities lead to land degradation, including soil erosion, land slides, drainage and flooding problems. MENR (2008) proposes a cess on the export value of gems and a tax based on the square area of building under construction. It has been estimated that a cess on 3% of the value of gem exports could generate about Rs 250 million to recover the environmental damages. A similar tax on the square area of the buildings constructed could generate funds for compensating the damages.

In addition, tobacco cultivation in many areas in the country, including those in upland areas, causes land degradation. In addition, cigarette smoke contributes to air pollution, and increase health risks and medical treatment costs. If a cess is levied on the excise tax paid by tobacco producers, cigarette manufacturers and importers that could be used to mitigate the damages. The excise tax that was collected in 2006 was Rs 30 billion and 1% of that amount to Rs 300 million per year (MENR, 2008).

#### **iv. Energy taxes**

Carbon dioxide emitted by different fossil fuels differs considerably. For example, oil products emit less carbon per unit of energy than coal. Natural gas has the lowest carbon dioxide emissions. With a properly-

**Table 1: Suggested Cess Rates for Hazardous Chemicals**

Hazard level	Cess rate (as a percentage of CIF value)
Extremely hazardous (WHO Class IA)	100 percent
Highly hazardous (WHO Class IB)	80 percent
Moderately hazardous (WHO Class II)	60 percent
Slightly hazardous (WHO Class III)	50 percent

Source: MENR, 2008.

**Table 2: Potential Revenue from Agro-chemicals Imported in 2007**

Chemical Type	Revenue (Rs million)
Weedicides	2,380
Fungicides	269
Insecticides	1,377
Total	10,301

Source: Gunawardena, 2010

**Table 3: National-level Taxes and Levies in the Tourism Sector of Sri Lanka**

Type of charge	Rate	Proportion of revenue received by	
		Sri Lanka Tourist Board	Other agencies
Embarkation levy	US\$ 15 /air ticket	US\$ 5	Air port and aviation services (US\$ 5) Treasury (US\$5)
Tourism development levy	1 percent of turnover	100 percent	0 Percent
Registration, licence and inspection fees	Rs 500 to Rs 10,000	100 percent	0 Percent
Environmental Protection Licence fee	Rs 750	0 percent	100 percent to Central Environmental Authority

Source: MENR, 2008

designed energy tax, users (both businesses and households) can be incentivised to substitute fossil fuels with less carbon intensive energy sources. With the clear link between fossil fuel energy use and carbon emissions, the tax rate should be designed in such a way that the carbon content of fuels is taxed uniformly.

Siriwardena *et al.* (2007) studied the impact of economy-wide emissions of carbon and energy taxes levied for electricity generation in Sri Lanka. The study used an input-output decomposition technique and analysed four types of effects that contribute to the overall reduction in equivalent carbon, nitrogen oxide and sulphur dioxide emissions. These four effects are: fuel mix effect (i.e., the change in emissions

due to variation of fuel mix), structural effect (i.e., change in emissions due to changes in technological coefficients with and without taxes), final demand effect (i.e., the change in emissions associated with changes in final demand) and joint effect (i.e., the interactive effect between or among the fuel mix, structural and final demand effects). The results indicated that the polluting-fuel sources and low-energy efficient technologies are less preferred under these tax regimes. Of the four effects, a change in fuel mix in thermal electricity generation and a change in final demand for electricity were found to be the main contributors in achieving economy-wide emission reductions. It was found in the analysis that a minimum of US\$ 50 per tonne of Carbon tax or US\$ 1.0/

MBtu (British thermal unit) of energy tax is required to have a significant impact on economy-wide emission reduction in the Sri Lankan context. This translates into an overall increase in electricity generation cost of approximately US\$Cts 0.9 per kWh and US\$Cts 0.6 per kWh under the carbon and energy tax regimes, respectively.

It was also found that, with the imposition of tax, coal-fired steam plants are replaced with cleaner technologies, such as, oil-fired combined cycle, IGCC (integrated

gasification combined cycle), supercritical coal and renewable plants, such as, wind, mini-hydro and dendro-thermal (wood fuel-fired plants) in the future electricity generation plans. Also,

the number of plants that are added for power generation is reduced due to the reduction in demand with increased taxes. This means, when a significant reduction in emissions is achieved, it leads to approximately 10–15% increase in average electricity prices. The study concluded that carbon taxes above \$50/tC in the electricity sector cause a visible reduction in economy-wide emissions. This value is \$1.0/MBtu in the case of energy taxes.

#### v. Taxes on pesticides

The present import tariff on pesticides in Sri Lanka is not based on any environmental consideration. MENR (2008) recommends classifying pesticides

according to environmental hazard class as defined by the World Health Organisation. Such differentiated tax has been able to reduce the consumption of pesticides and to shift pesticide consumption towards less harmful pesticides in Norway (NCM, 2006). Table 1 shows the suggested cess rates by MENR (2008) for hazardous chemicals in Sri Lanka.

The potential revenue from agrochemicals imported in 2007 based on the cess rates shown in the Table 1 is given in Table 2.

It is intended to achieve several objectives from such a scheme. Funds of such a scheme could be earmarked for integrated pest management activities which reduce the need for chemicals and for promotion of organic farming and eco-labelling programmes. Such programmes would not incur additional costs for the government.

#### vi. Taxes on Tourism

Table 3 summarises various types of taxes and levies applicable to tourism sector of Sri Lanka.

Tourism development levy is applicable to all private- and public-sector businesses, hotels, service providers, etc. The major part of the revenue of this tax is earmarked for expenditure on State-sponsored activities for tourism development. However, there are no clear guidelines on the utilisation of the funds.

However, a significant part of the revenues collected from the tourism sector goes to the treasury and collections made by the Tourism Board are utilised by the Board and it seems that they are not invested for conservation/protection of the natural resources concerned.

#### Potential for Environmental Tax Reforms

The concept of an environmental tax reform (ETR) involves shifting the taxes from conventional taxes,

such as, those levied on capital, to environment-related activities, such as, taxes levied on resource use or environmental pollution. The main aim of implementing this policy instrument is to ensure that the tax is imposed more on 'bads' than 'goods' by guaranteeing that the price signals provide an incentive to consumers and producers to change their behaviour.

In addition, a tax-shifting programme also intends 'revenue neutrality' which means that the increase in one is balanced by the reduction of the other, guaranteeing that there is no change in the overall tax level at the national level. In addition, ETR is thought to be able to increase human well-being through both economic and environmental pathways—by reducing resource use and pollution, by increasing output, employment and resource productivity, and by stimulating innovation and the development of green technologies. This could be one area that Sri Lanka could investigate the potential application. The existing tax system is fairly outdated and needs revisions immediately.

ETR as promoted by OECD (Organisation for Economic Cooperation and Development) and the World Bank can be an appropriate tool in pursuing environmental goals. Although the underlying principle of an ETR is similar in both developed and developing countries, their actual design and policy goals planned to be achieved may differ widely (Speck and Datta, 2007).

#### Conclusion

Sri Lanka has many environmental issues which warrant application of environmental taxes. The lessons learnt from other countries and theoretical experiments done in Sri Lanka could guide the successful application of such taxes. Delays

in application of resource taxes may lead to depletion of resources beyond their natural regeneration. It is usually accepted that environmental taxes need to be effective in terms of addressing the environmental concerns and raising the revenues. Environmental taxes are being applied in Sri Lanka in various forms at present. It will be important to recognise the various factors limiting the efficacy of environmental taxes in Sri Lanka and addressing them through appropriate institutional, administrative, regulatory and political adjustments.

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