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ENVIRONMENTAL TAXES IN PAPUA NEW GUINEA

by

Dr. John Asafu-Adjaye

School of Economics
The University of Queensland
Brisbane, QLD4072
Australia

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ABSTRACT

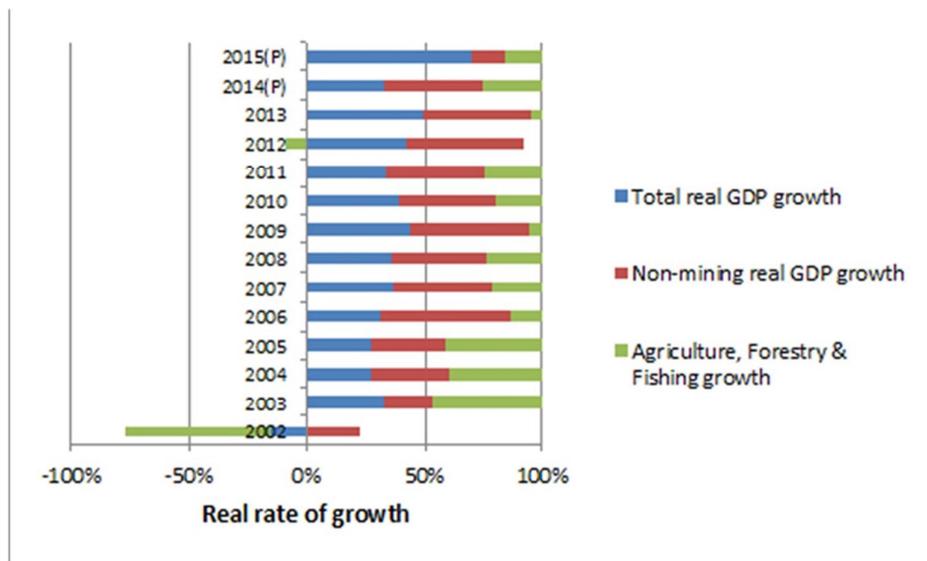
Pressure on natural resources and environmental quality in Papua New Guinea is highly likely to increase. Such pressure will come from the urgent need for the state to generate income for development purposes and also from population growth, which will increase the demand for natural resources. However, in order to protect the environment and to maintain the quality of life for both current and future generations of Papua New Guineans, there is a need for the Government to devise environment-related tax policies not only to conserve the environment but also to promote economic growth. In this regard, the main objectives of this paper are to review the options for applying environmental taxes in PNG and to make policy recommendations as part of the on-going taxation review. It is argued that, given PNG's current stage of development, it would be inappropriate to introduce certain environmental taxes such as a carbon tax or an energy tax. In addition to being regressive, such taxes could stifle PNG's development. However, in view of the fact that PNG has made an international commitment to contribute to mitigating global emissions, there is a need to consider other measures that would improve environmental quality. A range of taxes to reduce pollution are presented. In addition, taxes and subsidies for use in the renewable natural resource sector are proposed.

1. INTRODUCTION

Papua New Guinea (PNG) has recorded impressive economic growth over the past decade and a half on the back of a booming natural resource sector. Economic growth averaged 5.6 per cent per annum between 2005 and 2013 (Figure 1). However, the resource boom in PNG peaked in the mid-2000s. Figure 2 shows that resource revenue as a percentage of non-mining Gross Domestic Product (GDP) has fallen to levels below those experienced over the past decade. Currently, the share of total tax revenue in GDP is about 25 per cent. The importance of mining in revenue generation in PNG is highlighted by the fact that over the past six years mining and petroleum has contributed about 15 per cent of total tax revenues on average. However, the share of mining and petroleum tax in GDP has averaged only about 3 per cent per annum in recent years (Figure 2). Although, there are resource projects in the pipeline, it is clear that in order to meet its development objectives in a timely manner, PNG would need to increase its tax take from not only the mining and petroleum sector but also from the non-mining sector. It is with such concerns in mind that the Government of PNG initiated a comprehensive taxation review in 2013 to ensure that PNG has a modern tax system that is able to support the country’s medium and long-term economic and social development objectives (Department of Treasury, 2013).

Among other things the taxation review committee will consider submissions from various stakeholders in the country, including academic research on best practices elsewhere in the world. This paper forms part of the National Research Institute’s input into the taxation review process. The paper discusses the role of environmental taxes in this comprehensive taxation review and makes policy recommendations.

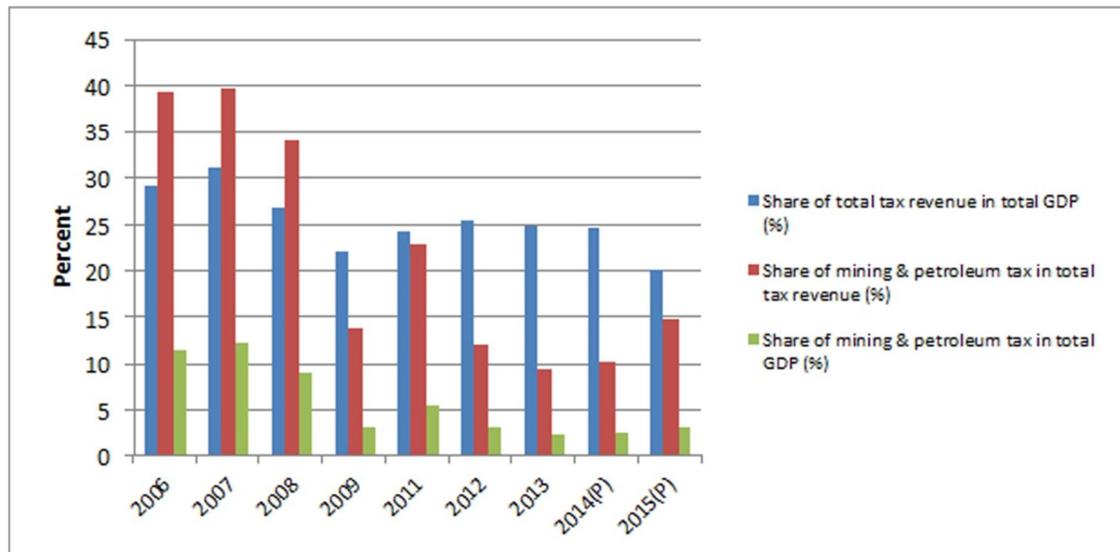
Figure 1: Papua New Guinea: real GDP growth and selected components, 2002–2015



Note: P – projected.

Source: Department of Treasury, various years.

Figure 2: Papua New Guinea: share of total tax revenue in GDP, share of mining and petroleum tax in total tax revenue and GDP, 2009–2015



Source: Department of Treasury, various years.

Environmental taxes are important for a variety of reasons:

- Environmental taxes could help PNG to maintain a healthy environment to enhance the welfare of its citizens and to sustain economic growth and development for the benefit of current and future generations. A highly degraded environment would be a major constraint to continued economic growth.
- Environmental taxes could be used to raise revenue that could be used to offset negative environmental effects of economic activity or resource exploitation. They could also be used to offset other price distortions in the economy (e.g. labour taxes)

Environmental taxes could be used to change the behaviour of individuals and firms that would ultimately lead to cost savings for the government. These cost savings could be in the form of reduced health expenditures or reduced clean up and waste disposal expenditures.

- From a distributive perspective, environmental taxes could be used to monitor the distribution of environmental taxes among taxpayers as well as viewing changes over time as taxation policy changes.
- As opposed to other environmental policy instruments, environmental taxes could promote innovation and technological progress on the part of firms.¹
- Finally, a key argument in favour of environmental taxes is their potential to achieve multiple objectives. As well as achieving certain environmental goals, the revenue generated may be used for poverty reduction or other development purposes, which is often referred to as the ‘double dividend’

In light of the foregoing discussion, the specific objectives of the paper are to critically review options for applying environmental taxes in PNG and to propose recommendations for the consideration of the taxation review committee. The methodology employed consists of a

¹ This issue is further explored in the paper.

detailed review of the literature on environmental taxes and practices in other countries, as well as a review of current practices in PNG based on interviews with senior staff from selected PNG national departments.

The remainder of the paper is organized as follows. Section 2 defines an environmental tax from both a theoretical point of view and from a practical (or operational) perspective. Definitions from selected advanced countries are also presented. Section 3 continues the discussion on environmental taxes by reviewing various types of environmental taxes and the uses to which they could be put. Within the context of the current taxation review, Section 4 analyses environmental tax policy options for PNG taking account of its current development stage. Section 5 concludes with the summary and conclusions.

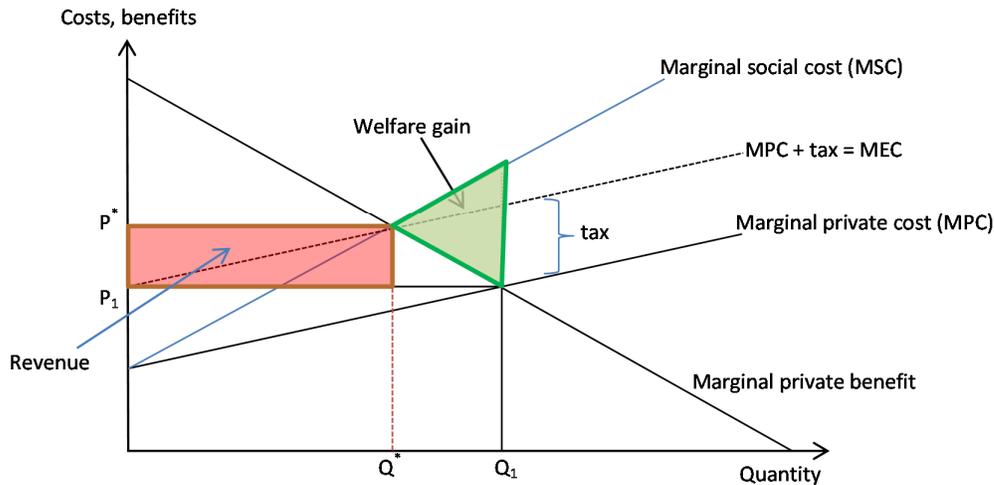
2. WHAT IS AN ENVIRONMENTAL TAX?

Environmental (or ‘green’) taxes form part of a suite of instruments including fees and charges, tradable permits, deposit-refund systems, and subsidies that can be used to manage the exploitation of natural resources and control pollution. These instruments are collectively referred to as *market-based instruments* (MBIs) and must be distinguished from other instruments such as environmental standards or regulations, which are referred to as *command-and-control* (CAC) instruments. Later in this paper we compare MBIs with CACs and argue that CACs are inferior to the former as far as sustainable natural resource management is concerned. The UN’s System of National Accounts (SNA) defines a tax as a compulsory, unrequited payment, in cash or in kind, made to the state by an individual or other legal entity. It is referred to as ‘unrequited’ because the state provides nothing in return to the individual or entity making the payment, although the state may use the funds raised in taxes to provide goods or services to other units, either individually or collectively, or to the community as a whole.

The concept of an environmental tax (also referred to as a Pigouvian tax) was proposed by the British economist Arthur Pigou to address the market failure caused by pollution (Pigou, 1920). As shown in Figure 3, individuals and firms who are causing pollution only consider their private marginal costs (MPC) and do not necessarily take into account the environmental damage (or externality) caused by their actions. This results in a higher level of consumption (and hence pollution or environmental damage) than what the socially optimal level should be (i.e., Q_1). According to Pigou, this problem could be addressed by imposing a tax that is proportional to the environmental damage caused.² The tax plus the MPC equals the marginal external cost (MEC), which eliminates the externality and results in a lower and hence socially optimal level of consumption (and pollution), Q^* . The revenue generated by the tax is given by the pink-shaded area and the green triangle represents a net gain to society. An environmental tax is consistent with the *Polluter-Pays-Principle*, PPP (OECD, 1989). It affects the relative prices of environmental-related products and activities, thereby forcing firms and individuals to pay for the negative externalities generated by their consumption or production activities.

Ideally, an environmental tax should be levied directly at the externality and equal the MEC of the emissions or production activity. This is referred to as a ‘first best’ tax. In practice, however, the implementation of an environmental tax tends to deviate from the theoretical optimum for a number of reasons. One of them is that the demand curve for pollution control and the marginal external cost curve are difficult to estimate, due to the fact that market prices do not exist for most environmental goods, such as clean air. Other considerations preventing the implementation of the theoretical optimum include market failures, conflicting political stands, pressure groups, and considerations other than pure economic efficiency concerns.

² Pigouvian taxes can also be negative. Where an activity yields positive externalities, a subsidy can increase private returns to the activity and so raise the willingness of private actors to undertake it.

Figure 3: Externality correcting environmental taxes

In many advanced countries some taxes are commonly described and incorrectly referred to as ‘environmental’, even in cases of low or no environmental externalities. Often the so-called environmental taxes include other elements such as fiscal taxes and resource rents. The next sub-section briefly considers definitions of environmental taxes used in the EC, the UK, and Australia.

2.1 The European Commission, OECD and IEA definition

In 1997 the European Commission, the Organisation for Economic Corporation and Development (OECD), and the International Energy Agency (IEA) decided to develop official statistics that would cover *environmentally related taxes*, that is, taxes related to energy, transport, and pollution, as well as taxes levied on resources (Eurostat, 2001; European Environment Agency, 2005; OECD, 2006). An environmentally-related tax was defined as:

‘A tax whose tax base is a physical unit (or a proxy of it) of something that has a proven, specific negative impact on the environment’ (Eurostat, 2001).

This definition includes all taxes on energy and transport but excludes value added taxes (VAT). The reason for excluding VAT is that it is deductible for many producers but not for households and thus was considered to have no influence on the relative prices in the same way that other environmental taxes do. Eurostat (2001) groups environmental taxes into four categories: energy, transport, pollution, and resources. Each of this is briefly discussed below.

2.1.1 Energy taxes

Energy taxes include taxes on energy production and on energy products used for both transport and stationary purposes. The most important energy products for transport purposes are petrol and diesel. Energy products for stationary use include fuel oils, natural gas, coal, and electricity. Carbon dioxide (CO_2) taxes are included under energy taxes rather than under pollution taxes. There are a number reasons for this, including the fact that it is often not possible to identify CO_2 taxes separately in tax statistics as they are integrated with energy

taxes, e.g. through differentiation of mineral oil tax rates according to the carbon content of the fuel.

2.1.2 Transport taxes

Transport taxes include taxes related to the ownership and use of motor vehicles. Taxes on other transport equipment (e.g. aircraft or ships) and related transport services (e.g. duties on charter or scheduled flights) are also included in this category when they conform to the general definition of environmental taxes. Transport taxes could be one-off taxes related to imports or sales of the equipment, or recurrent taxes such as an annual road tax. Taxes on petrol, diesel, and other transport fuels are considered as energy taxes and not transport taxes.

2.1.3 Pollution taxes

Pollution taxes include taxes on measured or estimated emissions to air and water, management of solid waste, and noise. An exception is CO₂ taxes, which are included under energy taxes as indicated above.

2.1.4 Resource taxes

Finally, resource taxes include taxes related to the extraction or use of natural resources, such as water, forests, and wild flora and fauna. The rationale is that these activities deplete natural resources. However, resource taxes exclude taxes designed to capture the resource rent from the extraction of natural resources. Environmental-related taxes also exclude land taxes, taxes on income and labour, and taxes on alcohol, tobacco and similar consumption taxes.

2.2 The UK Government's definition

The UK Government released its definition of an environmental tax in 2012. It defines an environmental tax as a tax that meets all of the following three principles (HM Treasury, 2012):

- the tax is explicitly linked to the government's environmental objectives;
- the primary objective of the tax is to encourage environmentally-positive behavioural change; and
- the tax is structured in relation to environmental objectives: for example, the more polluting the behaviour, the greater the tax levied.

Applying these principles, the UK Treasury identified a number of taxes as environmental, including the Climate Change Levy, Aggregates Levy, Landfill Tax, and the EU Emissions Trading System. The government indicated that other taxes could deliver environmental benefits, but their aim is revenue raising not environmental. These are specifically excluded from the UK Treasury definition. Examples of such taxes are the Vehicle Excise Duty, Fuel Duty, and Air Passenger Duty.

2.3 The Australian Government's definition

The Australian Government's definition of an environmental tax is similar to the European Commission's in that it defines it as "a tax whose tax base is a physical unit (or a proxy of it) of something that has a proven specific negative impact on the environment" (United Nations 2012, para. 4.150). From this definition, the statistics are compiled on the basis of the tax on a

good or a production process. In general, payments on the extraction of minerals or energy resources are excluded because such payments are recorded as payments on rent (i.e. payments for services). The above definition of environmental taxes includes taxes on production and imports, capital taxes, and current taxes on income and wealth. Following the OECD procedure, environmental taxes are divided into four broad categories: energy, transport, pollution, and resources. The environmental taxes currently levied in Australia are:

- Energy (including taxes such as carbon) and
- Transport (including taxes such as stamp duties).

Pollution and resource taxes are currently not legislated in Australia.

In general, payments that are not based on a physical unit with a negative impact on the environment are not considered as environmental taxes. These include local government rates (e.g. municipal rates), land taxes and stamp duties on transfer of land, and rents on non-renewable natural resources (e.g. the Petroleum Resource Rent Tax (PRRT) and the Minerals Resource Rent Tax (MRRT)). The Goods and Services Tax (GST) is also excluded.

3. THE PROS AND CONS OF ENVIRONMENTAL TAXES

Command and control mechanisms are the oldest forms of pollution control policies. As the name implies, the CAC mechanism consists of a ‘command’ which sets a standard (e.g. the maximum level of pollution allowable), and a ‘control’ which monitors and enforces the standard. Examples of standards include ambient standards, (e.g. for green house gases), emissions standards and technology standards (Asafu-Adjaye, 2005). Although CACs are widely understood, they have deficiencies with respect to providing incentives to reduce pollution. First, under a CAC mechanism, firms and households have no incentives to reduce pollution beyond the standard. Second, penalties for violating standards tend to be too low and enforcement tends to be weak. Third, to set an optimal standard and penalty, the government must know the demand (marginal social benefit) and the supply (marginal social cost) curves for pollution abatement. However, since air (or water) quality is a non-market good, the demand curve is not directly observable. Also, it is difficult for the government to know exactly the industry’s marginal abatement (or external) cost curve, given the large number of polluters. In light of the above reasons, it is likely that the government will get the standard wrong.

Fourth, to be effective, standards need to be revised frequently in response to rapidly changing circumstances. However, in practice, legislation tends not to keep up with the pace of change. By far the most serious defect of standards is the fact that they are uniformly applied to all firms and regions. This takes flexibility away from polluters. The fact of the matter is that pollution abatement costs differ between firms and regions, and forcing high-cost abaters to reduce pollution as much as low-cost abaters, results in more resources being used to achieve a cleaner environment. The community can achieve cost savings by having more abatement undertaken by firms that can do so at a relatively lower cost.

Unlike CACs, MBIs use price or some other economic variables to provide incentives for economic agents to abate pollution. MBIs are more cost-efficient in that they have been shown to achieve the same environmental objectives at a lesser cost than CAC mechanisms (Tietenberg, 1991). They provide incentives for reducing pollution and have the potential to raise revenue. In 2011 environmental taxes in the UK raised 43 billion pounds sterling, equivalent to 8 per cent of GDP (Leicester, 2013). Unlike CACs, MBIs minimize the risk of regulatory capture by reducing the need for individual negotiations with stakeholders. However, an environmental tax, considered as a specific type of MBI, also has disadvantages. First, it also suffers from the same deficiency faced by standards in that the demand curve for pollution abatement and the marginal external cost curve may not be known precisely, thereby making it difficult to set the optimal tax rate. Although it must be pointed out that a tax is more flexible than a regulation or standard and therefore can be manipulated more easily to reach the desired level. A uniform tax rate may not be efficient but, on the other hand, it may be difficult to differentiate the tax appropriately. Environmental taxes may add to the costs of tax collection and compliance. However, by far the greatest concern of environmental taxes is that they may be regressive. But this concern must not be assumed to be true for all countries. The evidence in the UK has been mixed. While energy taxes have been found to be regressive, vehicle fuel taxes appear not to be. This is due to low vehicle ownership amongst the poor. On the other hand, taxes on aviation have been found to be progressive.

A study conducted by Blobel and Gerdes (2011) found that in several European countries, environmental taxes have had regressive effects⁶ i.e., poorer population groups pay more in

relation to their income than richer population groups and these effects remain to some extent even in the presence of redistribution and compensation mechanisms. However, the report rejects the idea of keeping the prices of energy and other environmental resources low as a means of social policy. Instead, the authors argue in favour of a careful overall policy design that ensures access to basic energy and transport services for all parts of the population while maintaining effective price signals, especially at higher levels of consumption.

Therefore, it would appear that, to be more effective in achieving key environmental goals, an environmental tax may need to be combined with other instruments. Examples of such MBIs include Pigouvian taxes and subsidies in the renewable resources sector, user fees (or charges), and tradable emission permits. Tradable emission permits are not relevant for PNG given the structure and size of its economy and therefore we ignore them and briefly discuss the others.

3.1 Renewable resource taxes

Renewable resource taxes include user fees or charges, payments for ecosystem services, forest taxes, forest subsidies, and fisheries taxes. Each of these is briefly discussed.

3.1.1 User fees (or charges)

User fees/charges are strictly speaking not taxes because they are voluntary payments made or received in exchange for goods or services. They are, however, included here because they are like Pigouvian taxes in some respects. In particular, user fees and Pigouvian taxes serve the same functions in terms of regulating the use of a natural resource (by discouraging excessive use) and generating revenue for the state. An appropriate user charge or user fee could result in some cost recovery and promote the maintenance of sustainable resource use. User fees evoke the same concerns as environmental taxes with respect to their effects on the poor. However, in cases where regressive impacts are likely, the solutions (e.g. lowering charges for low income households, or exempting them altogether) are broadly the same as those suggested for taxes.

3.1.2 Payments for ecosystem subsidies

Payments for ecosystem services (PES) are a form of Pigouvian subsidy or negative tax. In this case, the resource owners are paid to conserve the resource or to achieve stated environmental goals. The Millennium Ecosystem Assessment defines PES in four different categories as follows:

“Ecosystem services are the benefits provided by ecosystems. These include provisioning services such as food, water, timber, fibre, and genetic resources; regulating services such as the regulation of climate, floods, disease, and water quality as well as waste treatment; cultural services such as recreation, aesthetic enjoyment, and spiritual fulfilment; and supporting services such as soil formation, pollination, and nutrient cycling” (Millennium Ecosystem Assessment, 2005:39).

Costanza et al. (1997) estimated the global value of ecosystem services to be about US\$33 trillion. Barbier (2007) undertook a cost-benefit study of clearing mangrove swamps in Thailand to establish shrimp farms. He estimated that the activity generated net returns of

US\$1,220 per hectare, which far exceeded the direct benefits of the mangrove swamps. However, when the wider value of ecosystem services to local people, including the regulation of fisheries and coastal management were included in the analysis, the net returns increased to US\$12,000 per hectare. From such studies, it is clear that ecosystem values are valuable in the sense that they provide a range of local and global benefits. However, local communities that traditionally own such resources have no incentives to conserve them, especially when there are commercially viable alternatives for their exploitation. The aim of PES is to overcome this disincentive by paying a subsidy to landowners to manage the resources so that environmental services continue to flow sustainably. Natural resources such as forests support a wide range of biodiversity, which has real economic benefits for many stakeholders. They also help to protect and regulate water sources, benefiting everyone within a given area. Forests also function as global carbon sinks and provide environmental benefits not only to the local communities but also to the world.

3.1.3 Forest taxes

The most common forestry management model used in most countries (including PNG) is to grant long-term concessions to logging companies and impose forest fees on them. However, this system has been proven to be ineffective in promoting sustainable forestry management (GIZ, 2005). In general, it results in underpricing of timber and sends wrong signals about the value of the forest, leading to overharvesting of forest resources. The fees also do not capture sufficient forest rents for the state. A far better approach would be to use a combination of area-based taxes, volume-based taxes, and export taxes. These taxes, calibrated at the right rates and linked to global prices to maintain constant incentives, would be capable of maintaining a given level (and form) of forest cover, and stimulating a sustainable domestic timber processing industry. However, the experience in many developing countries (including PNG) is that forest taxes have not been encouraging due to a range of factors including poor enforcement and inability to prevent illegal logging. One of the difficulties associated with determining the optimal forest tax is valuation of the marginal external costs and marginal benefits of logging. However, this does not mean that they should not be attempted as the level of the taxes can be adjusted from time to time and it is clearly a better option than doing nothing.

3.1.4 Forest subsidies

Given the problems associated with implementing a forest tax, it is clear that although a good idea in principle, they may not by themselves encourage sustainable forest management. There is a need to provide landowners an incentive for undertaking sustainable management activities by compensating them. An example of this form of compensation is the UN's Reducing Emissions from Deforestation and Forest Degradation (REDD) programme. The REDD programme is designed to place a value on the carbon content of forests. Under the scheme, payments would be made to developing countries to preserve their stock of forests and maintain them as carbon sinks. The REDD+ programme extends the framework to include payments for sustainable forest management, forest conservation and afforestation. Following the Copenhagen Climate change conference, it is envisaged that up to US\$30 billion per year may ultimately be transferred to developing countries through REDD+. Progress on REDD+ has currently stalled pending a binding global climate change agreement. However, going forward, PNG needs to consider how schemes such as PES and REDD+ could be integrated into a national system of forest taxation and regulation.

3.1.5 Fisheries taxes

Many would agree that PNG has underexploited the opportunities provided by her extensive economic exclusive zone (EEZ). For a long time the country has relied on bilateral fishing agreements with foreign governments, allowing their trawlers to fish in PNG's waters. Such agreements can be criticized on the basis that, given poor monitoring, it could have resulted in overfishing of certain species and that the government has not benefited much from the tax revenues. From a value-chain perspective, PNG could maximize the benefits of her marine resources by developing a viable fish processing industry. In this respect, the proposed Pacific Zone Marine Industrial Park in Madang is a step in the right direction. The state could raise revenue through a number of tax instruments. Firstly, limits could be placed on the total allowable catch and catches taxed on a volume basis. Secondly, incentives could be offered for the employment of Papua New Guineans, involvement of Papua New Guineans businesses, and the establishment of fish processing industries within the country. Finally, significant resources should be devoted to monitoring and enforcement of the system. Efficient local management of fisheries is of paramount importance. To promote sustainable management of the resources, it would be necessary to involve local fishing communities.

4. DEVELOPING COUNTRY EXPERIENCE OF ENVIRONMENTAL TAXES AND THE OPTIONS FOR PAPUA NEW GUINEA

4.1 Environmental taxes in developing countries

Although environmental taxes have historically been associated with the developed countries, in recent years these types of policy instruments are increasingly being applied in developing countries in response to various concerns, some of which are environmental in nature. The Government of Vietnam brought into force an Environmental Tax Law in 2012 (GIZ, 2011). Under the law taxes are levied not only on energy with respect to refined fuels and coal, but also on environmentally harmful substances, such as hydrochlorofluorocarbons (HCFCs), selected pesticides, and soft plastic bags. Prior to the law coming into effect, taxes were already levied on petrol and diesel and thus no additional tax was imposed on them. In China's 12th 5-year plan unveiled in 2011, the Government indicated that it would place emphasis on improving air and water quality. A government White Paper released in 2011 hinted that an emissions trading scheme would be introduced (Government of China, 2011). China already has a Pollution Levy System that addresses water- and air-borne pollutants.

Environmental taxes have been applied in the forest sector of several African countries with mixed success. A 2007 study estimated that Tanzania was losing up to 96 per cent of potential tax revenues, or US\$58 million per year (Milledge et al., 2007). This loss was blamed on a number of factors including corruption and lack of transparency in the awarding of logging rights. In contrast, Cameroon successfully implemented a forest tax that resulted in revenues growing from US\$3 million to US\$30 million between 1995 and 2001, accounting for a quarter of government revenues (OECD, 2008). The key lessons from the Cameroonian experience are that auctioning of logging rights captures more rent than fixing rents on an administrative basis; also, it was found that while higher taxes (and greater enforcement) may discourage over-logging, they also incentivise illegal logging (Karsenty, 2011).

In 1997, Costa Rica implemented a carbon tax, with the proceeds being used to fund payments (i.e. PES) to landowners to manage forests sustainably. The fund now distributes around US\$15 million per year, and has been credited with maintaining biodiversity as well as significant reforestation (OECD, 2008). Namibia, which gained political independence in 1990, has successfully used fisheries taxes to manage its fish stocks. Three key measures were employed. Firstly, limits were placed on the total allowable catch, quotas were allocated to a specified number of vessels, and the fish catch was taxed on a volume basis. Secondly, incentives were offered (in terms of tax rebates on the catch and the awarding of longer quota right periods) for the employment of Namibians, involvement of Namibian businesses, and the establishment of fish processing industries within the country. Thirdly, significant resources were devoted to monitoring and enforcing the measures. The policy has generally been perceived to be successful. The onshore processing industry is the fastest growing in Namibia's economy and fish stocks which were heavily depleted prior to independence have returned to more sustainable levels (Sumaila et al., 2005).

Despite the revenue potential of fuel taxes, a number of developing countries do not impose taxes on fuels on equity grounds in that they disproportionately impact the poor. Also, because of equity concerns, not only do some countries leave fuel untaxed but they also subsidise its use. However, recent increases in fuel costs due to rising oil prices have exerted significant fiscal pressure on the budgets of many developing countries. For example, it is now estimated that about a quarter of the Indonesian government's spending goes to fuel

subsidies (Coady et al., 2010) and it has now began the process of removing some of the subsidies.

4.2 Current environmental taxes in Papua New Guinea

Papua New Guinea does not currently have environmental taxes of the Pigouvian variety. However, there are a number of *ad valorem* excise duties, levies, and fees in existence. In the transport sector, there are fuel duties, vehicle excise duties, and air passenger duties. There are currently no energy taxes in the energy sector. In the natural resource sector, there are a range of fees that prospective companies are required to pay. These include application fees that form part of the Environmental Impact Statement (EIS), environmental permit fees, including water use permits that depend on the amount of water to be used, and waste disposal fees that are based on the amount of waste disposed. The Department of Environment and Conservation (DEC) also charges fees for the collection of biodiversity material and samples when sent overseas for research purposes. The schedule of fees payable is specified in the Environmental Act 2000.

The DEC uses these fees, as required under the Act, to regulate the activities of companies that have an impact on the environment. The DEC has introduced the concept of Biodiversity Offsets. In this approach, companies that are planning to undertake economic activities that will have adverse environmental impacts in a given part of the country will be required to pay fees to conserve particular areas to be determined by DEC. The DEC has established a Trust Fund, which will be backed by a law still being drafted. The Trust Fund will be managed by an independent Board. Fees and charges levied on resource developers, as well as donor funds provided for environmental protection and climate change, will be channelled into this fund and the money will be used for conservation activities. Parliament has recently passed a Bill to create a Conservation and Environmental Protection Authority (CEPA). CEPA will consist of the current DEC and the Department of Climate Change. The CEPA Act will give the Authority the power to impose new environmental charges and amend the current ones.

4.3 Policy recommendations for Papua New Guinea

Pressure on natural resources and environmental quality in PNG is highly likely to increase in the future. Such pressure will come from the urgent need for the state to generate income for development purposes and also from population growth, which increases demand for resources. However, in order to protect the environment and to maintain the quality of life of both current and future generations of Papua New Guineans, there is a need for the Government to devise short- and medium-term environment-related tax policies to conserve the environment and to promote economic growth. The current taxation review therefore provides an excellent opportunity to consider policies that could be implemented over time.

It is important to emphasise that any suggested policies need to be subjected to further analysis to ensure that they are relevant and/or appropriate for PNG at different stages of her development process. Therefore, to start with, we rule out theoretically appropriate policies such as a carbon tax. This is because PNG's per capita emissions are minute in global terms and they are not likely to grow rapidly. Thus, any benefits are likely to be outweighed by the foregone opportunities to earn income for development. However, PNG has committed herself internationally to address climate change and therefore other measures need to be considered. We propose below policies in the areas of transport, pollution, energy, and renewable natural resources. Following that, we consider institutional and operational issues to be addressed before these policies can be successfully implemented.

4.3.1 Transport

Given the problem of traffic congestion on city roads, the Government has, over time, increased the sales duty on imported motor vehicles. The duty is currently about 100% of the sale value. However, considering population growth and increasing incomes, this measure is unlikely to be effective in reducing traffic congestion and urban air pollution. The sales duty is a one-off tax. In its place, or in combination with the sales tax, we propose a recurrent tax – an annual road tax. This could start at a flat rate. However, over time, as capacity is built, the tax could be linked to vehicle emissions. For this to be effective, standards and regulations must be established for air quality. Furthermore, the importation of old vehicles (e.g., more than 10 years) should be banned. Alternatively, an environmental levy could be imposed on the importation of used cars that would be proportional to the age of the car. This would discourage the importation of old vehicles. These measures would not be highly regressive because it is the rich and relatively well-off citizens who drive. To lessen the impacts on the poor, exemptions could be given for commercial vehicles that are used for public transport. One of the key factors underlying the rapid increase in motor vehicle ownership is the lack of a public transport system. Therefore, implementation of these measures needs to be accompanied by investments in public transport to provide alternatives to driving. Furthermore, the road infrastructure needs to be improved to justify the road tax.

4.3.2 Pollution

The measures proposed above will also reduce air pollution. In addition, there is a need to provide measures to reduce incentives for the dumping of waste. There are currently fines for littering. However, it is doubtful if the fines are sufficiently high to change littering habits. There is a need to discourage the use (and dumping) of plastic bags and bottles by imposing a small fee. This fee could be levied on the suppliers of these products, although it is likely that some of the fee would be passed on to consumers. However, there is generally a need for public education against the practice of the littering of plastic products. On the issue of waste management, in general, there is the need to encourage Public Private Participation (PPP) in the management of landfill and waste disposal. This is because, given population growth and rapid urbanization, this issue is likely to become important in the future and public agencies may not be adequately resourced to deal with it. Still on pollution, the importation of used refrigerators that use chlorofluorocarbons in their cooling systems should be banned and subsidies given to households with such refrigerators to purchase new ones.

4.3.3 Energy

At this stage of PNG's development, we do not advocate a fuel tax based on the carbon content of fuel, which is common in many advanced countries. This is because such a tax is likely to be regressive: even though the poor do not drive, they can be impacted adversely through the use of other products such as electricity, public transport, and paraffin. However, we propose that any subsidies on fuel should be gradually phased out to reduce the burden on the public purse. Furthermore, innovative policies should be introduced to encourage the more efficient use of energy. First, a tax could be placed on the sale of incandescent light bulbs, while the sale of fluorescent light bulbs could be subsidised. Second, tax exemptions could be given to LPG use to shift demand for biomass. Third, tax exemptions could be placed on the sale of solar water heaters. In the medium to long term, tax incentives should be given for the sale or use of photoelectric solar panels to generate domestic and industrial electricity. However, in the medium term, as PNG becomes more developed, an energy tax or fuel excise tax based on the carbon content of fuel would need to be considered.

4.3.4 Renewable natural resources

We advocate the establishment of Payment for Ecosystem Services (PES) mechanisms all over PNG with the support and participation of local communities to encourage the wise use of the country's natural capital (forests, fisheries, and biodiversity). Consideration should be given to how PES could be integrated into on-going programs such as REDD+. A further analysis of the institutional and management arrangements need to be carefully undertaken to ensure smooth implementation of the two programmes. Currently, the Environment Act 2000 does not support REDD+ and therefore an amendment to the Act may be necessary. With specific reference to the forestry and fisheries sectors, we advocate volume-based taxes to replace the current area-based and quota-based approaches. In the long term, we advocate the integration of mechanisms such as PES and REDD+ into the national forestry and fisheries taxation systems.

4.3.5 Institutional and implementation issues

In general, people do not like to pay new taxes, and environmental taxes are no exception. Two factors that are important in gaining public support for any environmental tax are: (i) explaining why the tax is necessary and how the revenues will be spent; and (ii) public education and awareness. People need to be assured that the tax is not just a revenue raising measure. The revenues could be spent in a number of ways including a direct tax break on labour income, indirectly as a tax break on household income, to fund poverty reduction initiatives or for environmental conservation (e.g. conservation of protected areas). Stakeholder input should be encouraged in determining which approach would be more suitable. There is a need for multi-agency and stakeholder collaboration on the design of these taxes to minimize the risk of duplicate taxes. Finally, after implementation, environmental taxes must be monitored to track their impacts in terms of effectiveness and equity and whether there are any unintended consequences. This would enable measures to be taken to address any adverse effects.

5. SUMMARY AND CONCLUSIONS

Papua New Guinea is richly endowed with natural resources (both renewable and non-renewable), which have generated substantial revenues to the state. However, the Government cannot continue to rely so heavily on natural resource taxes to fund its development needs. Therefore, it needs to explore ways in which it can increase its tax take. This paper has discussed the contribution that environmental taxes could make to revenue generation. Environmental taxes belong to the group of instruments referred to as market-based incentive mechanisms (MBIs). In the paper, MBIs were compared to regulations (or standards), which is an alternative form of pollution control instrument; and it was shown that the former are more effective in achieving environmental goals, in addition to giving firms and households incentives to reduce pollution. In addition to environmental taxes, other forms of MBIs, specifically renewable resource taxes, were discussed. These include user fees (or charges), payments for ecosystem services, forest taxes, forest subsidies, and fisheries taxes. After discussing the experience of environmental taxes in selected developing countries, the paper assessed environmental tax options for PNG.

It was argued that, given PNG's current stage of development, it is inappropriate to introduce certain environmental taxes such as a carbon tax or an energy tax. In addition to being regressive, such taxes could stifle the progress of PNG's development. However, in view of the fact that PNG has made an international commitment to contribute to mitigation of global emissions, there is a need to consider other measures that would improve environmental quality. In that respect a range of taxes to discourage traffic congestion and reduce motor vehicle pollution, discourage dumping of plastic waste, and promote energy conservation were recommended. In addition, a range of taxes and subsidies in the renewable natural resource sector were also proposed. These include volume-based taxes for fisheries and forestry and the promotion of subsidy schemes such as Payment for Ecosystem services and REDD+.

To gain public support for such environmental tax (and subsidy) initiatives, it would be necessary to undertake public awareness and education campaigns. Stakeholder input should be encouraged in decisions regarding the recycling of the tax revenues. There would also be a need for various government agencies to collaborate on the design of the taxes in order to avoid duplication. Finally, it was advocated that upon implementation, each type of tax should be monitored to assess the impacts in terms of effectiveness and equity in order to determine whether there is the need to institute measures to mitigate any unintended impacts.

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