Toolkit of Measures for Managing Environmental Externalities in Urban Areas

Promoting green urban development in Africa: enhancing the relationship between urbanization, environmental assets and ecosystem services
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Promoting green urban development in Africa: enhancing the relationship between urbanization, environmental assets and ecosystem services

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Prepared for
The World Bank

Prepared by
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PREFACE AND ACKNOWLEDGEMENTS

This study forms one component of the case studies of a larger study on Promoting Green Urban Development in Africa commissioned by the World Bank and led by AECOM. The study was led by Petrina Rowcroft and Jennifer Black of AECOM with inputs gathered from city-level stakeholders through a series of workshops and meetings in Durban and Kampala.

We are grateful to Roland White, Chyi-Yun Huang and Anna Gueorguieva of the World Bank, Diane Dale, Brian Goldberg, Vineet Diwadkar, Robert Merrill and John Bachmann of AECOM for guidance and discussions during the course of compiling the toolkit and for helpful comments on the drafts. We would also like to extend our thanks to the staff at Kampala Central City Administration (KCCA) and eThekwini Municipality who so generously gave up their time to participate in workshops and meetings.
By investing in natural capital, cities can lower their operating costs and support local economic development. Recent studies have shown, for example, that investing in ecological infrastructure in cities, and the ecological restoration and rehabilitation of ecosystems such as rivers, lakes, wetlands and forests occurring in and around urban areas, may not only be ecologically and socially desirable, but also quite often, economically advantageous. For example, investments in restoring or enhancing urban ecosystems may play a crucial role in increasing the adaptive capacity of cities to deal with climate change whilst also simultaneously generating a number of other services (e.g. spaces for recreation or habitat for wildlife) that enhance human well-being. Other potential co-benefits include job creation, capacity building, poverty alleviation, improved health, enhanced resilience and longer-term sustainability through revenue raising and attracting inward investment.

In this light, urban planners and environmental managers globally are increasingly recognizing the need to adopt more integrated approaches that strengthen synergies between economic, social and environmental objectives and promote green urban development.

**Aims of This Toolkit**

The purpose of this toolkit is to provide an overview of a selected sample of generic policy measures and instruments that specifically address the challenges raised by ‘greening’ urban development. It focuses on instruments that may be able to help leverage finance (from private sector, national government and donors) to address the range of environmental problems faced by cities in developing countries, including low quality housing, poor access to services, pollution and safety hazards, and to support the implementation of green urban development measures.

The toolkit is intended primarily as a resource for urban managers and planners in African cities. As such, the instruments that are included have been specifically selected because they address some of the most pressing environmental challenges faced by rapidly growing African cities while at the same time contributing to the achievement of wider sustainable development goals.

The toolkit complements a wide range of other guidelines and manuals covering integrated urban environmental planning, green city development and mainstreaming ecosystem services into municipal functioning. These are valuable volumes in themselves and the reader is encouraged to use these alongside this toolkit.

**Policy Instruments and Measures**

It is important to note at the outset that none of the instruments presented in this toolkit provides a one-size-fits-all solution to managing urban environmental externalities. The most appropriate measures and strategies to manage these externalities depends highly on the local context and will depend on, amongst other things, the most pressing environmental, social and economic issues, the resources at hand and the political economy. To be effective and sustainable, the instruments described here are best situated within a package of complementary measures that lie within a much broader, yet integrated urban environmental planning and management framework. In particular, the successful implementation of measures requires a supportive regulatory and policy framework that is accompanied by information and awareness-raising, capacity building and ongoing monitoring and evaluation. Stakeholder participation during the design and implementation of measures is likely to be key to their acceptability and sustainability. And last, but not least, consideration needs to be given to the finance necessary to support the design and operation of instruments and measures. Appendix 1 sets out some of the funds that may be accessed to support green urban development activities.

EXECUTIVE SUMMARY

**Background**

Cities depend on a healthy natural environment that continuously provides a range of services or benefits to society and the economy. Managing the urban environment is, however, a complex task. Many urban cities in Africa are struggling to meet their infrastructure needs; maintain or provide adequate service delivery; and upgrade city systems to keep pace with the rate of change, urbanization, and population growth. Identifying what investment is required in urban areas to enable economic activity, and to create livable and vibrant cities in an environmentally sustainable way is the key challenge for decision makers, but also presents significant opportunities.

By investing in natural capital, cities can lower their operating costs and support local economic development. Recent studies have shown, for example, that investing in ecological infrastructure in cities, and the ecological restoration and rehabilitation of ecosystems such as rivers, lakes, wetlands and forests occurring in and around urban areas, may not only be ecologically and socially desirable, but also quite often, economically advantageous. For example, investments in restoring or enhancing urban ecosystems may play a crucial role in increasing the adaptive capacity of cities to deal with climate change whilst also simultaneously generating a number of other services (e.g. spaces for recreation or habitat for wildlife) that enhance human well-being. Other potential co-benefits include job creation, capacity building, poverty alleviation, improved health, enhanced resilience and longer-term sustainability through revenue raising and attracting inward investment.

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The instruments included in this toolkit were identified following a broad review of the literature and were selected according to a number of criteria and following discussions with relevant stakeholders around the nature and significance of the urban environmental issues that they face and their priorities for addressing these.

Each of the instruments described in this toolkit may be used to address one or more environmental externalities. The user is therefore encouraged to first consider the nature of the externality to be addressed (i.e. what is the problem) and the drivers of change or causes of environmental degradation (i.e. what are the root causes of that problem). This will in turn help identify where efforts to reverse, or prevent further degradation, need to be targeted. The range of environmental issues that may be addressed by each instrument is identified through a series of icons.

Each of the instruments is then described in terms of:

- The key environmental challenges or urban externalities it seeks to address
- The concepts and principles underlying each instrument (or how the instrument works in theory)
- How the instrument works in practice, including reference to the wider policy, regulatory, legislative and operational considerations
- Where it has been applied in practice and the key lessons learnt, drawing on examples from African cities wherever possible

Links to further information, including relevant examples, are also provided.

A summary overview of each of the instruments covered by this toolkit is provided in the table overleaf.
<table>
<thead>
<tr>
<th>Instrument</th>
<th>Key environmental issue addressed</th>
<th>Objectives</th>
<th>Level of application</th>
<th>Co-Benefits</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Plastic Bag Levy                 | Plastic waste                     | • To reduce waste at source  
• To reduce litter                                                               | Manufacturers/retailers/consumers     | Flood alleviation                                                          | Widely applied; specific examples include South Africa and Botswana     |
| Wastewater Discharge Charge      | Water quality                      | • To discourage discharges to water                                        | Industry                              | Health, aquatic ecology, reduced water treatment costs                     | South African Wastewater Discharge Charge. Similar in Colombia and Dar Es Salaam |
| Pollution Charge – Emissions to Air | Air quality                       | • To discourage harmful emissions to air                                   | Industry                              | Health, productivity                                                       | Chinese Levy System – penalties applied to industry for emissions; also Mexico and Colombia |
| Tax Exemptions on Alternative Fuels | Air quality, forest degradation    | • To discourage harmful emissions to air                                   | Woodfuel users, manufacturers/retailers/vehicle users | Health, biodiversity, water attenuation, climate regulation | Widely applied. Uganda, Senegal, Botswana and India all have zero VAT on LPG. |
| Fuel Levy/Differential Tax       | Air quality, forest degradation    | • To discourage pollution / harmful emissions to air                        | Woodfuel users, Manufacturers/retailers/vehicle users | Health, climate regulation                                                 | Thailand, Taiwan
Thai introduced a differential tax system which offered unleaded fuel at discount relative to leaded fuel. The discount was subsidized by a surcharge on leaded fuel. |
| Deposit Refund System            | Solid waste                        | • To encourage recycling / reduce the amount of waste sent to landfill  
• Can be linked to livelihoods support programs                                | Manufacturers/retailers/consumers     | Employment/poverty alleviation Resource efficiency | Korea, South Africa, Kenya, Uganda (Kampala), Sri Lanka, Venezuela, China, Mexico. E.g. A mandatory deposit refund systems is in place in Mexico; new car battery can only be sold with the return of an old one as batteries are considered highly hazardous waste and are difficult to dispose of. |
<p>| Payments For Ecosystem Services, Including Fiscal Transfer Mechanisms and Other Results-Based Finance Schemes | Water quality, water supply, flood attenuation | • To restore / maintain the provision of ecosystem services to downstream beneficiaries | Municipality (on behalf of citizens) or beneficiary businesses or intergovernmental (in case of fiscal transfers) or project-based | Climate regulation, habitat for biodiversity, employment/poverty alleviation, cost savings | Numerous examples in Latin America, Asia and east and southern Africa, including the South African Working for Water Program |
| Environmental Funds              | Can be used to generate funds to address numerous environmental externalities | • To provide long-term stable funding for projects that focus on environmental conservation or enhancement activities that would not otherwise be funded by the governmental or private sector. | Multiple scales – projects and programs | South African Working for Water Program | Numerous examples in Africa, Latin America and SE Asia |
| Community-Based Natural Resource Management | Forest degradation, wetland degradation | • To re-establish / encourage local knowledge and traditional land use practices to restore degraded landscapes and improve the livelihoods of indigenous people. | Municipality / project | Climate regulation, habitat for biodiversity, employment, cost savings, indigenous knowledge | Tanzania, Zimbabwe, Botswana |</p>
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>CBD</td>
<td>Central Business District</td>
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<tr>
<td>BMZ</td>
<td>Bundesministerium Für Wirtschaftliche Zusammenarbeit (German Federal Ministry for Economic Development Cooperation)</td>
</tr>
<tr>
<td>BWP</td>
<td>Botswana Pula</td>
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<tr>
<td>CAMPFIRE</td>
<td>Communal Areas Management Programme for Indigenous Resources</td>
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<tr>
<td>CBFM</td>
<td>Community Based Forest Management</td>
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<tr>
<td>CBNRM</td>
<td>Community Based Natural Resource Management</td>
</tr>
<tr>
<td>CMAs</td>
<td>Catchment Management Agencies</td>
</tr>
<tr>
<td>CSR</td>
<td>Corporate Social Responsibility</td>
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<tr>
<td>DEA</td>
<td>South African Department of Environmental Affairs</td>
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<tr>
<td>DRS</td>
<td>Deposit Refund Scheme</td>
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<tr>
<td>DWA</td>
<td>South African Department of Water Affairs</td>
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<tr>
<td>EERF</td>
<td>Energy Efficiency Technology</td>
</tr>
<tr>
<td>EF</td>
<td>Environmental Funds</td>
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<tr>
<td>ENCON</td>
<td>Energy Conservation</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>GEF</td>
<td>Global Environment Facility</td>
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<tr>
<td>GRF</td>
<td>Green Revolving Funds</td>
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<tr>
<td>IFC</td>
<td>International Finance Corporation</td>
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<tr>
<td>KCCA</td>
<td>Kampala Capital City Authority</td>
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<tr>
<td>KIP</td>
<td>Laotian Kip</td>
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<tr>
<td>LAWMA</td>
<td>Lagos Waste Management Authority</td>
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<tr>
<td>LPG</td>
<td>Liquefied Petroleum Gas</td>
</tr>
<tr>
<td>MBIs</td>
<td>Market-Based Instruments</td>
</tr>
<tr>
<td>NGOs</td>
<td>Non-Governmental Organizations</td>
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<tr>
<td>NOx</td>
<td>Nitrogen Oxides</td>
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<tr>
<td>NRM</td>
<td>Natural Resource Management</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<tr>
<td>PES</td>
<td>Payments for Ecosystem Services</td>
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<tr>
<td>PLMC</td>
<td>Plastics Levy Management Committee</td>
</tr>
<tr>
<td>P-PP</td>
<td>Public – Private Partnership</td>
</tr>
<tr>
<td>PPP</td>
<td>Polluter Pays Principle</td>
</tr>
<tr>
<td>REDD+</td>
<td>Reducing Emissions from Deforestation and Degradation</td>
</tr>
<tr>
<td>REDISA</td>
<td>Recycling and Economic Development Initiative of South Africa</td>
</tr>
<tr>
<td>RedLAC</td>
<td>Red de Fondos Ambientales de Latinoamérica y el Caribe</td>
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<tr>
<td>SEI</td>
<td>Sussex European Institute</td>
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<tr>
<td>TEEB</td>
<td>The Economics of Ecosystems and Biodiversity</td>
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<tr>
<td>UNDP</td>
<td>United Nations Development Programme</td>
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<tr>
<td>UNEP</td>
<td>United Nations Environment Programme</td>
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<tr>
<td>USA</td>
<td>United States of America</td>
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<tr>
<td>VAT</td>
<td>Value-Added Tax</td>
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<tr>
<td>WD</td>
<td>Levy Waste Discharge Levy</td>
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<td>WDCS</td>
<td>South African Wastewater Discharge Charge System</td>
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<tr>
<td>WMC</td>
<td>Waste Mitigation Charge</td>
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<tr>
<td>WWF</td>
<td>World Wide Fund for Nature</td>
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I. INTRODUCTION

This Toolkit

The purpose of this toolkit is to provide an overview of a selected sample of generic policy measures and instruments that specifically address the challenges raised by ‘greening’ urban development. It focuses on instruments that may be able to help leverage finance (from private sector, national government and donors) to advance the ‘brown agenda’¹ and support the implementation of green urban development measures.

The toolkit is intended primarily as a resource for urban managers and planners in African cities. As such, the instruments that are presented have been specifically selected because they address some of the most pressing environmental challenges faced by rapidly growing African cities while at the same time contributing to the achievement of wider sustainable development goals.

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Why is the Toolkit Needed?

Cities depend on a healthy natural environment that continuously provides a range of benefits, known as ecosystem services (see Box 1). Some examples of ecosystem services include drinking water, clean air, healthy food, and protection against floods. Healthy ecosystems are the foundation for sustainable cities, influencing and affecting human well-being and most economic activity.

Many urban cities in Africa are struggling to meet their infrastructure needs; maintain or provide adequate service delivery; and upgrade city systems to keep pace with the rate of change, urbanization, and population growth. The benefits of growth over the last decade or so have been uneven and the gap between rich and poor is widening in several parts of the continent². In

¹ The Brown Agenda typically refers to the range of environmental problems faced by cities in developing countries. These include the traditional issues of poor quality housing and poor access to services, as well as the pollution and safety hazards associated with rapid industrialization. Both lead to poor environmental health.


Box 1: Natural Capital and Ecosystem Services

Natural Capital can be defined as the world’s stocks of natural assets which include geology, soil, air, water and all living things. It is from this natural capital that humans derive a wide range of services, often called ecosystem services, which make human life possible³.

Examples of ecosystem services include products such as food and water, regulation of floods, soil erosion and disease outbreaks, and non-material benefits such as recreational and spiritual benefits in natural areas. Some ecosystem services involve the direct provision of material and non-material goods to people and depend on the presence of particular species of plants and animals, for example, food, timber, and medicines. Other ecosystem services arise directly or indirectly from the functioning of ecosystem processes. For example, the service of formation of soils and soil fertility that sustains crop and livestock production depends on the ecosystem processes of decomposition and nutrient cycling by soil micro-organisms.

The concepts of natural capital and ecosystem services help us recognize the many benefits that nature provides⁴. From an economic point of view, the flows of ecosystem services can be seen as the ‘dividend’ that society receives from natural capital. Maintaining stocks of natural capital allow the sustained provision of future flows of ecosystem services, and thereby help to promote enduring human well-being.

There is growing evidence that many ecosystems have been degraded to such an extent that they are nearing critical thresholds or tipping points, beyond which their capacity to provide useful services may be drastically reduced. Nowhere is this more prescient than in rapidly growing cities where the pace of growth and development often outstrips the capacity of local administrations to plan or to protect. Lack of information, understanding and planning about the effects of decisions on the environment can lead to the loss of essential and beneficial ecosystem services.⁵ From an economic point of view, this means the sub-optimal use of this ‘natural capital’, resulting in unnecessary losses in local welfare, city budgets and business opportunities.⁶

³ The World Forum on Natural Capital: http://naturalcapitalforum.com/about/

⁴ TEEB (2010) The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB.


⁶ The World Forum on Natural Capital: http://naturalcapitalforum.com/about/
addition, limitations in human and financial capital, technical expertise, and limited community awareness of environmental issues all contribute to the challenge that city leaders face in implementing initiatives to develop or upgrade urban infrastructure. Compounding these challenges, increasingly scarce natural resources and degraded ecosystems within and around urban areas often means that the required investments are starting from a low base, increasing the potential up-front costs and often requiring significant justification to gain the necessary support to proceed. The degradation of natural assets and the consequent erosion of the value of the ecosystem services they provide is further aggravated by climate change and climate-induced extreme weather events.

Evidence suggests that, by investing in natural capital, cities can lower their operating costs and support local economic development. Recent studies have shown, for example, that investing in ecological infrastructure in cities, and the ecological restoration and rehabilitation of ecosystems such as rivers, lakes, wetlands and woodlands occurring in and around urban areas, may not only be ecologically and socially desirable, but also quite often, economically advantageous. For example, investments in restoring or enhancing urban ecosystems (‘green and blue infrastructure’ — see Box 2) may play a crucial role in increasing the adaptive capacity of cities to deal with climate change whilst also simultaneously generating a number of other services (e.g. spaces for recreation or habitat for wildlife) that enhance human well-being. Other potential co-benefits include job creation, capacity building, poverty alleviation, improved health, enhanced resilience and longer-term sustainability through revenue raising and attracting inward investment.

What is Included in this Toolkit?

This toolkit therefore presents a suite of generic policy and other instruments that public agencies within African cities may consider for both mitigating the negative environmental externalities deriving from urbanization and for enhancing green urban development. As noted above, none of the instruments described in this toolkit offers a ‘silver bullet’. For any of them to be effective and enduring, they need to sit within a package of complementary measures that lie within a much broader, yet integrated urban environmental planning and management framework. In particular, the successful implementation of measures requires a supporting regulatory and policy framework and needs to be accompanied by information and awareness-raising, capacity building and ongoing monitoring and evaluation. Stakeholder participation during the design and implementation of measures is likely to be key to their acceptability and sustainability. And last, but not least, consideration needs to be given to the finance (see Box 4) necessary to support the design and operation of instruments and measures.

Box 3: Green Urban Growth

The OECD defines an urban green growth approach as one that seeks to foster economic growth and development through urban activities that reduce environmental impact. These may include activities that emit fewer pollutants and greenhouse gas emissions, reduce consumption of natural resources, including water, energy and undeveloped land; and protect ecological functions.


Box 2: Green Infrastructure

Urban green infrastructure is a network of green spaces, water and other natural features within urban areas. ‘Green infrastructure’, includes parks, playing fields, gardens, green roofs and walls, and cemeteries. The term refers to ecological processes rather than color, so includes sustainable urban drainage systems, wetlands, rivers and canals, which are also sometimes referred to as ‘blue’ infrastructure.

In this light, urban planners and environmental managers globally are increasingly recognizing the need to adopt more integrated approaches that strengthen synergies between economic, social and environmental objectives and promote green urban development. Green urban development (see Box 3) is understood here to mean cost-effective development that enhances rather than degrades the value of ecosystems. More specifically, by ‘greening’ urban development we mean:

- addressing environmental issues, and particularly the unintended impacts of development (or negative externalities);
- providing incentives for uptake of more environmentally sensitive practices or more sustainable consumption and production; and
- taking advantage of opportunities to realize the value of the services that nature provides through, for example, investing in green infrastructure that can improve public health and bring recreational use benefits
- Integrated urban planning that can foster higher economic growth through an improved urban form and lower agglomeration externalities, higher innovation, better sectoral growth for tourism

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The toolkit is also not exhaustive. It focuses predominantly on policy instruments, i.e. instruments that provide guiding principles for urban decision-makers. In practice, these are likely to be accompanied by a combination of process, management and urban management measures as illustrated in the figure below.

Figure 1.1 Measures for Addressing Environmental Externalities

### Box 4: Sources of Finance

Apart from conventional sources of finance, there is a range of other green financing mechanisms that may be considered to support activities that promote green and climate-resilient urban development. These include:

- The Global Environment Facility
- The Green Climate Fund
- The Clean Development Mechanism
- Climate Investment Funds

Further information on each of these funds can be found in Appendix 1.

In addition to these funds that may provide the necessary start-up capital, this toolkit also describes a number of financing mechanisms implementable at a local level that may support the longer-term sustainability of measures. These include:

- Taxes or charges levied on the consumers of polluting products or users of natural resources
- Payments for ecosystem services
- Developer contributions
- Revolving funds
- Fiscal transfers

The instruments included in this toolkit were identified following a broad review of the literature and were selected according to a number of criteria and following discussions with relevant stakeholders. The selection criteria covered:

- **Environmental effectiveness** – is the instrument considered effective from the viewpoint of environmental management?
- **Economic efficiency** – the degree to which the instrument could achieve a given environmental objective can be achieved with a specific instrument; how cost-effectively can that instrument change behavior. Must minimize the cost to authorities to ensuring standards are enforced and not place excessive burdens on private enterprise.
- **Administrative feasibility and cost** – considering issues such as capital implications for new investments that may be required, legal implications, technical implications, capacity implications, expertise that will be needed or any new institutional capacities that may have to be created.
- **Acceptability** – amongst the general public, environmentally-oriented public, government, politicians, affected sectors of industry.
- **Micro-financial impact** – impacts on households who may have to bear a new cost; affected industries whose production cost structures may change; impacts on city authorities in terms of potential for new revenue streams.
- **Macro-economic impact** – impacts on employment, contribution to GDP
- **Equity** – to what extent might the instrument result in unacceptable (disproportional) impacts on the poor or private enterprise?
- **Innovation** – priority was given to emerging instruments that address urban environmental challenges using an innovative approach

The toolkit complements a wide range of other guidelines and manuals covering integrated urban environmental planning, green city development and mainstreaming ecosystem services into municipal functioning – see Table 1.1. These are valuable volumes in themselves and the reader is encouraged to use these alongside this toolkit.

### How the Toolkit is Structured

The remainder of the toolkit presents each of the instruments in turn. Each instrument has been structured to include details of:

- The key environmental challenges or urban externalities it seeks to address
- The concepts and principles underlying each instrument (or how the instrument works in theory)
- How the instrument works in practice, including reference to the wider policy, regulatory, legislative and operational considerations
- Where it has been applied in practice and the key lessons learnt, drawing on examples from African cities wherever possible
- Links to further information.

### How to Use This Toolkit

At the outset, it is important to understand the nature and significance of the environmental externality to be addressed. Perhaps even more importantly, it is necessary to have an understanding of the key drivers of change or the causes of environmental degradation as this will help identify where efforts to reverse, or prevent further degradation, need to be targeted.

Each of the instruments presented in this toolkit may apply to one or more environmental issues. To aid the user, we have used icons throughout the toolkit to identify the key issues to which each of the instruments can most readily be applied. These are as follows:

- **Water Quality and Wastewater**
- **Solid waste**
- **Land Degradation**
- **Air quality**
- **Flooding**
- **Deforestation**
<table>
<thead>
<tr>
<th>Resource</th>
<th>Description</th>
<th>Hyperlink</th>
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<tr>
<td>TEEB - The Economics of Ecosystems and Biodiversity (2011) TEEB Manual for Cities: Ecosystem Services in Urban Management.</td>
<td>Highlights how a focus on ecosystem services and their valuation can create direct benefits for urban areas and can be performed even with limited resources. Provides an easily understandable introduction to the subject of ecosystem services; how to determine their value; and, how to incorporate a consideration of ecosystem services into municipal functioning as a long-term investment to enhance existing municipal management.</td>
<td><a href="http://www.teebweb.org/wp-content/uploads/Study%20and%20Reports/Additional%20Reports/Manual%20for%20Cities/TEEB%20Manual%20for%20Cities_English.pdf">http://www.teebweb.org/wp-content/uploads/Study%20and%20Reports/Additional%20Reports/Manual%20for%20Cities/TEEB%20Manual%20for%20Cities_English.pdf</a></td>
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<tr>
<td>The Cities Alliance (2007) Livable Cities: The Benefits of Urban Environmental Planning. A Cities Alliance Study on Good Practices and Useful Tools</td>
<td>Describes how cities may employ different instruments to integrate the environment into urban planning and management approaches: policy instruments, process instruments, planning instruments and management instruments. The report investigates how these instruments are applied in several well-established approaches to integrated urban planning.</td>
<td><a href="http://www.unep.org/urban-environment/PDFs/LiveableCities.pdf">http://www.unep.org/urban-environment/PDFs/LiveableCities.pdf</a></td>
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<tr>
<td>Dodman, D., McGranahan, G. and Dalal-Clayton, B. (2013) Integrating the Environment in Urban Planning and Management. Key Principles and Approaches for Cities in the 21st Century. UNEP</td>
<td>An update to the Cities Alliance report listed above that examines how the various tools identified in that report have been applied by cities, specifically how effective they have been in incorporating environmental issues into city planning processes.</td>
<td><a href="http://www.citiesalliance.org/sites/citiesalliance.org/files/publications/integrating_the_environment.pdf">http://www.citiesalliance.org/sites/citiesalliance.org/files/publications/integrating_the_environment.pdf</a></td>
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<tr>
<td>Asian Development Bank (2015) Green City Development Toolkit</td>
<td>Introduces the key concepts of Green City development and includes a summary of relevant urban sectors, highlighting crosscutting themes and benefits of actions. Sets out a framework for undertaking assessments of urban areas and determining green and sustainable development responses. It also provides an inventory of current and existing resources that complement and support the design and preparation of green and sustainable development actions.</td>
<td><a href="http://www.greengrowthknowledge.org/sites/default/files/learning-resources/materials/GreenCityDevToolKit_ADB.pdf">http://www.greengrowthknowledge.org/sites/default/files/learning-resources/materials/GreenCityDevToolKit_ADB.pdf</a></td>
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</table>
A summary overview of each of the instruments covered by this toolkit is provided in the table overleaf.

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Key Environmental Issue Addressed</th>
<th>Objectives</th>
<th>Level of Application</th>
<th>Co-Benefits</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Plastic Bag Levy                                | Plastic waste                     | • To reduce waste at source  
  • To reduce litter                                                   | Manufacturers / retailers / consumers | Flood alleviation                           | Widely applied; specific examples include South Africa and Botswana                                                                                                                                 |
| Wastewater Discharge Charge                     | Water quality                      | • To discourage discharges to water                                      | Industry                           | Health, aquatic ecology, reduced water treatment costs            | South African Wastewater Discharge Charge. Similar in Colombia and Dar Es Salaam                                                                                                                   |
| Pollution Charge – Emissions to Air             | Air quality                        | • To discourage harmful emissions to air                                 | Industry                           | Health, productivity                                            | Chinese Levy System – penalties applied to industry for emissions; also Mexico and Colombia                                                                                                          |
| Tax Exemptions on Alternative Fuels             | Air quality, forest degradation    | • To discourage harmful emissions to air                                 | Woodfuel users, manufacturers / retailers / vehicle users | Health, biodiversity, water attenuation, climate regulation | Widely applied  
  
  Uganda, Senegal, Botswana and India all have zero VAT on LPG.                                                                                                                                                                                    |
| Fuel Levy/Differential Tax                       | Air quality, forest degradation    | • To discourage pollution / harmful emissions to air                     | Woodfuel users, manufacturers / retailers / vehicle users | Health, climate regulation                                        | Thailand, Taiwan  
  
  Thailand introduced a differential tax system which offered unleaded fuel at discount relative to leaded fuel. The discount was subsidized by a surcharge on leaded fuel.                                                                                     |
| Deposit Refund System                            | Solid waste                        | • To encourage recycling / reduce the amount of waste sent to landfill  
  • Can be linked to livelihoods support programs                     | Manufacturers / retailers / consumers | Employment / poverty alleviation Resource efficiency | Korea, South Africa, Kenya, Uganda (Kampala), Sri Lanka, Venezuela, China, Mexico. E.g. A mandatory deposit refund systems is in place in Mexico; new car battery can only be sold with the return of an old one as batteries are considered highly hazardous waste and are difficult to dispose of. |
| Payments For Ecosystem Services, Including Fiscal Transfer Mechanisms and Other Results-Based Finance Schemes | Water quality, water supply, flood attenuation | • To restore / maintain the provision of ecosystem services to downstream beneficiaries | Manufacturers / retailers / vehicle users | Climate regulation, habitat for biodiversity, employment / poverty alleviation, cost savings |                                                                                                                                                                                                           |
| Environmental Funds                              | Can be used to generate funds to address numerous environmental externalities | • To provide long-term stable funding for projects that focus on environmental conservation or enhancement activities that would not otherwise be funded by the governmental or private sector. | Manufacturers / retailers / consumers | Depend on the particular activities being financed | Numerous examples in Africa, Latin America and SE Asia                                                                                                                                                  |
| Community-Based Natural Resource Management      | Forest degradation, wetland degradation | • To re-establish / encourage local knowledge and traditional land use practices to restore degraded landscapes and improve the livelihoods of indigenous people. | Municipality / project | Climate regulation, habitat for biodiversity, employment, cost savings, indigenous knowledge | Tanzania, Zimbabwe, Botswana                                                                                                                                                                          |
### II. PLASTIC BAG LEVY

#### PLASTIC BAG LEVY

<table>
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<th>This instrument addresses</th>
<th>Water Quality and Wastewater</th>
<th>Air Quality</th>
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**Targets**
- Litter reduction
- Sustainability within product life cycle at producer / manufacturer scale
- Environmental risks associated with plastic bags

**Type of instrument:** Market Based Instrument: Product charge / Levy

**Key considerations**
- Charges must be monitored and enforced to ensure compliance
- Effectiveness may decline as consumers adjust to the price
- Banning can potentially lead to the unintended consequence of a rise in a black market trade
- Implementation at city-scale may require new by-laws to be passed

**Key stakeholders**
Retailers, consumers, government

**Case study examples:**
- Kenya
- Botswana
- South Africa

#### 2.1 Overview

The plastic bag levy is an instrument designed to assist in the management of solid waste by targeting the waste generated by discarded plastic bags. Their low cost of production and multiple uses, such as for transporting fresh food from supermarkets and less formal market stalls, has led to their widespread popularity. Additionally, they have numerous re-use functions and are commonly used for collecting household waste.

Discarded, single-use plastic bags incur environmental and economic costs. They incur an environmental cost by clogging up water bodies and leaching toxic chemicals from the plastic bags into the groundwater. They can also have an adverse impact on livestock, wildlife and marine life. Discarded single-use plastic bags incur a high economic cost by contributing to litter problems and increasing litter clean-up costs. The aesthetic impact of discarded plastic bags hanging from trees and discarded by road sides is unsightly and has potential negative health impacts on local populations.

A number of life cycle analysis assessments have been conducted which examine the impact of single-use plastic bags. The assessments concluded that the extent of the negative impact of single-use plastic bags depends on the thickness, frequency of use and re-use and how they are disposed of at the end of their life\(^1\). The production and manufacture of plastic bags has a large environmental impact as it generates significant emissions of harmful air pollutants\(^2\). Furthermore, disposing of bags in landfill or through littering has a long term damaging environmental impact. Plastic bags disposed of in landfill can take several decades to

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decompose, or longer, depending on the type of material used to produce the bag and the weather conditions.

Solid waste management, including plastic bag waste management, is a complex challenge that requires integrated environmental policies to address the problem. Plastic bag levies can play a role as part of a suite of policies. The objective of implementing a plastic bag levy is to reduce demand for plastic bags and ultimately bring about a reduction in the volume of plastic waste discarded in the environment. It is essentially a form of product charge, which has the potential to bring about an added co-benefit if revenues are recycled.

Plastic bag levies have been implemented globally with varying degrees of success. The plastic bag levy has been successfully implemented in several African nations. In the cases reviewed, implementation has been at a national, rather than city scale. This approach can help to avoid displacement or leakage effects, that is, where manufacturers locate in areas (or retailers’ source bags from areas) where the levy does not apply to avoid the levy. Typically, plastic bag levies are introduced to reduce the use of non-reusable (or single-use) plastic bags and to promote re-use and recycling behavior, where possible. In theory, this tackles two environmental concerns; a reduction in the amount of litter generated by discarded plastic bags and unsustainable consumer behavior. It can also lead to improved environmental awareness about the benefits of reducing waste.

With the necessary enabling environment, including education and awareness-raising about the purpose of the levy and transparency in the way in which funds that are raised are subsequently used, a plastic bag levy could be widely and successfully applied in other African cities/nations.

### 2.2 How the Instrument Works

The plastic bag levy is underpinned by the polluter pays principle which states that whoever is responsible for damage to the environment should bear the costs associated with it. There are generally two approaches to implementing a plastic bag levy:

- Collecting the levy directly from shoppers at retail outlets. This has been shown to yield larger reductions in the consumption of plastic bags; or
- Collecting the levy from the manufacturers or importers of bags. Targeting suppliers who are far less in number than shoppers may be the most cost-effective option where implementation and administration capacity is weak. This is the approach that has been adopted in South Africa, although consumers ultimately bear the costs as the manufacturers pass the costs on to retailers who in turn pass the costs on to consumers.

Levies are typically applied based on the thickness of the plastic bags and the production of thicker bags which are more durable for re-use are encouraged. In practice, thin single-use plastic bags, typically 17 microns thick, are often banned and the levy applied to plastic bags of 30 microns thick. For example, the South African plastic bag levy was brought into force regulating the minimum thickness of plastic bags. Plastic bags were previously 17 microns thick. This was raised to an initial minimum of 24 microns thick on the basis that five years after the introduction of the levy, this would be raised to a minimum of 30 microns thick. Botswana adopted a similar approach by specifying that plastic bags, manufactured in Botswana, or imported, must be a minimum of 24 microns thick. The focus on the thickness is an attempt to ensure that plastic bags are sufficiently durable for re-use.

Implementing a plastic bag levy requires political, societal and commercial agreement and support. An appropriate levy fee must be determined and monitoring system established to ensure compliance. Local authorities are central to the enforcement of the levy, monitoring implementation, ensuring that the levy is structured correctly at the retail level and taking action where retailers have failed to comply. In practice, the levy is usually implemented as part of a Waste Management Act.

Levies can be introduced in conjunction with the establishment of environment funds which are managed by environment departments. Funds raised by the levy can then be used to achieve a range of outcomes including waste recovery activities, research and development into waste management, implementation of waste management plans, enforcement of existing waste management legislation, partnership projects to improve the quality of local environments and support environmental education and awareness campaigns.

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2.3 How It Works in Practice

Plastic bag levies have been introduced in a number of countries at various stages of development, including several countries in Europe, Hong Kong, South Africa, Botswana and Kenya.

The following summarizes the considerations that have arisen through the implementation of plastic bag levies around the world.

2.3.1 Financial

If the levy is adequately enforced, revenues will be collected, which can be used to achieve other policy objectives.

2.3.2 Co-benefits

Implementing a plastic bag levy can result in co-benefits. For example, a levy can contribute to poverty alleviation by stimulating job creation, if it is implemented in conjunction with financing for the establishment of recycling centers which can then offer employment opportunities. It can also be linked into livelihood support programs as in the example of Buyisa-e-Bag, a non-profit company established in South Africa in tandem with the implementation of the plastic bag levy. Buyisa-e-Bag aimed to promote the reduction of waste, conduct awareness raising initiatives amongst the plastics industries and create jobs.

By establishing financial charges and promoting accountability for environmental harm, the levy can play a role in broader solid waste management. The levy can also raise awareness of the connection between consumer behavior and environmental degradation which may extend beyond the management of plastic bags.

Job creation co-benefits typically needs institutional support from an appropriate authority. For example, the Lagos Waste Management Authority (LAWMA) in Nigeria, initiated support for Public / Private Partnership and employment opportunities in resource recovery through the ‘Waste to Wealth’ program. This program included: nylon plastic recycling, Kraft paper collection and a buy-back program from scavengers.

2.3.3 Challenges

The South African experience suggests that over time consumers adjust to the levy, resulting in limited behavioral modification. This suggests that levies, in isolation, may offer a limited solution in the long run.

This is also a risk that a plastic bag levy may lead to a shift from thin single-use plastic bag use towards thicker bags designed for re-use. However there is evidence that such re-useable carrier bags—which often cost little more than the levy—are not always re-used.

2.4 Case Studies

The following case study examples illustrate applications of the instrument in different nations.

Box 5: Plastic Bag Levy in Kenya

In Kenya, over 24 million plastic bags are used every month, half of which end up in the solid waste mainstream. Plastic bags now constitute the biggest challenge to solid waste management in the country. Chain supermarkets within Kenya and informal street kiosks rely heavily on single-use plastic bags. It is estimated that approximately 173,000 tons of plastic waste are released every year into the waste stream, of which in the region of 1% is currently recycled and 30% is collected by Nairobi City Council and private waste handlers and sent to landfill. A Plastics Levy Management Committee (PLMC) was established to design and implement a plastic bag levy on plastic bags less than 30 microns thick.

In 2007, Kenya banned the manufacture and import of thin plastic bags, with limited success as the ban was not enforced. In 2011, the use of thin bags was banned and a tax was imposed on thicker bags. The levy has had limited results as neither the tax nor the ban has been well enforced.


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6 Ibid

7 Lagos Waste Management Authority http://www.lawma.gov.ng/lawma_faq.html

A plastic bag levy was introduced in South Africa at 3 cents per bag in 2004, payable by plastic bag manufacturers and importers. This increased to 4 cents per bag in 2009 and from 2013 rose to 6 cents per bag. The levy was targeted at manufacturers, with the expectation that they would pass it on to the consumers.

A total of ZAR1.1bn has been collected from the introduction of the levy between 2004 to October 2014. The constitution required all monies collected to be deposited into the National Revenue Fund, with the intention that the funds collected would be used to establish recycling facilities. In practice this has not happened as the Treasury does not allow taxes to be “ring-fenced”. Therefore the Department of Environmental Affairs (DEA) applies for the funds from the Treasury so that it can invest in recycling. To date, the DEA has established 15 plastic buy-back centers and supports 25 existing facilities.

An evaluation of the levy four years after its introduction showed that while there has been an overall decline in the number of plastic bags used, the effectiveness of the levy has declined over time. This is attributed to consumers becoming accustomed to the levy and it therefore no longer acts as a disincentive.


Box 6: Plastic Bag Levy in Botswana

In an attempt to manage the plastic litter waste resulting from plastic bags, Botswana implemented a plastic bag levy that took effect in 2007. The Botswana plastic bag legislation sets out terms regulating the minimum thickness of plastic bags. It bans the manufacture and import of plastic bags thinner than 24 microns. Any violation of this by any company or individual is punishable by a jail sentence of three years and a fine of BWP2 5,000. The cost of plastic shopping bags has to be transparent and disclosed publicly.

Retailers are free to set their own levy price, but the overall price of plastic bags across all retailers, increased by 31% within 18 months of the levy’s introduction.

Overall, the introduction of the levy has led to a decline in the consumption of plastic bags with the following results:

- Plastic bag use decreased by 24% in the weeks following the introduction of charges for plastic bags, with low-income retailers experiencing the steepest decline of 42%, followed by high-income retailer (39%)
- Within 18 months, overall plastic bag use dropped by 50% compared to pre-levy consumption

The results from the Botswana experience indicate that leaving retailers to set the price levy has mixed results depending on the ability of consumers to pay. As the levy is higher in high-income retail outlets, larger reductions in plastic bag usage have been achieved in these outlets.

A key difference between the Botswana example and other schemes is that the levy amount was not specified by the government, retailers could set their own charges and retailers were not obliged to charge for plastic bags.


Box 7: The Plastic Bag Levy in South Africa
### 2.5 Links to Further Information

Further guidance can be found at the following links:

<table>
<thead>
<tr>
<th>Resource</th>
<th>Link</th>
<th>Description of Resource</th>
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<tbody>
<tr>
<td>World Bank (2005) Environmental Fiscal Reform. What Should Be Done and How To Achieve It</td>
<td><a href="http://siteresources.worldbank.org/INTRANETENVIRONMENT/Publications/20712869/EnvFiscalReform.pdf">http://siteresources.worldbank.org/INTRANETENVIRONMENT/Publications/20712869/EnvFiscalReform.pdf</a></td>
<td>Aims to provide a starting point for informing decisions about what reforms are most relevant to a given sector and country, and how the Environmental Fiscal Reform process can be effectively designed and implemented.</td>
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### III. POLLUTION CHARGES

#### Pollutant Charges

<table>
<thead>
<tr>
<th>This instrument addresses</th>
<th>Water Quality and Wastewater</th>
<th>Air Quality</th>
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**Targets**

Harmful emissions to air or water and reductions in harmful pollutants

**Type of instrument:** Market based instrument for pollution control

**Key considerations**

- More complex to co-ordinate when there are multiple sources of pollution
- Monitoring and enforcement are costly
- Requires monitoring data on pollutants

**Key stakeholders**

Industry, small businesses, local government

**Case study examples:**

- Emission fees, China
- Wastewater Discharge Scheme, South Africa

#### 3.1 Overview

Market-based instruments (MBIs), such as charges, taxes and tradable emission permits can be applied for environmental protection purposes. Pollution charges are a type of MBI that seek to address negative externalities that arise as a result of pollution caused by firms. The aim of the pollution charge is to incentivize firms to behave in a more environmentally responsible manner by penalizing them or ‘charging’ per unit of pollution.

A pollution charge can address externalities such as poor air quality, water quality, solid waste and noise pollution. It can take a number of different forms, for example disposal fees, effluent permit fees and emission fees.

The overarching benefit of a pollution charge is that it is more flexible than a command and control instrument because it can be targeted at specific pollutants or specific geographical locations. Pollution charges are particularly suitable in regions and cities where resources to implement, control and monitor a given intervention may be limited.

Taxes are typically used as revenue raising instruments.

Charges or fees are designed to offset costs incurred by the government in cleaning up pollution

#### 3.2 How the Instrument Works

The objective of a pollution charge is to recover the costs associated with the impacts of pollution and the administration of the scheme.
There are two main ways of implementing pollution charges:

1. Emission fees, with the charge based on the volume of pollution generated:

   A regulator establishes the level of a given pollutant that a firm can discharge (i.e. the abatement level). A charge is imposed when the standard is exceeded. A firm that is concerned with minimizing the charges will seek to reduce the volume of pollutant discharged where doing so costs less than the pollution charge.

   Identifying the appropriate value for the pollution charge requires technical knowledge. Ideally, the price should be set such that it is equal to the cost that the pollution causes to society. For example, the costs of cleaning up a polluted water source and making it potable, or the cost of addressing health problems that have arisen as a result of the pollution. Due to the high number of variables, it is difficult to establish in advance the value of the pollution charge that will be most effective in discouraging polluting behavior.

2. Taxes applied as a proportion of the volume of pollution generated:

   A pollution tax can be easier to implement than an emission fee as it does not require an abatement level to be determined. Taxes have proven successful when applied to fuel use to incentivize the use of cleaner, less polluting fuel such as leaded petrol.

   Fuel taxes can be an attractive option for government as fuel consumption is typically easier to monitor than emissions. A weakness of fuel taxes is that they can have a regressive impact resulting in a disproportional negative impact on the poor. They also require political support and need to be set at a sufficiently high level to create a disincentive for use.

   At the scheme design stage, it is necessary to identify the polluting firms, their location, the source of pollution and the geographical range of the impact of the pollution. At scheme design stage it is also necessary to determine the appropriate pollution charge level. Charges / tax rates can be based on a calculation of the average marginal cost of abatement. However, it is challenging to establish the marginal cost of abatement and there is a risk that the charge may be set too low with the result that firms decide to pay the charge rather than change their behavior. Because of these challenges, charges / tax rates are typically established based on the cost of administrating the scheme and therefore only partially pay for clean-up costs.

   It is also necessary to consider the measurement, monitoring capabilities of the entity responsible for administering the scheme. To avoid the need for costly monitoring technologies, reasonable proxy measures for the volume of pollution discharged can be estimated. These include: basing estimates of the volumes of discharge produced for an industry of a particular size, rather site-specific monitoring; using statistical estimation techniques in lieu of expensive end-of-pipe pollution technologies such as the estimation of pollution generation via models; the indirect determination of pollution generation via waste treatment or waste collection.

   Pollution charges offer policy-makers a tool that can simultaneously:
   - Be applied as emissions fees or taxes
   - Reduce pollution at industry and household scale
   - Incentivize technological development

Box 8: The Swedish Charge on NOx Emissions

A pollution tax can also be set at a high level that incentivizes good behavior and offers rebates in exchange for a desired output. In 1992 Sweden implemented a charge to incentivize firms to generate cleaner energy by offering relatively clean facilities rebates in excess of payments while relatively dirty facilities pay more in charges than they receive in rebates. The charge is applied to NOx emissions and industry pay the charge on emissions of NOx and receive rebates in proportion to their energy output. The result is a mechanism that raises no revenue for the government yet produces significant incentives for firms to innovate to make existing operations less pollution intensive.


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1 U.S. Environmental Protection Agency ‘Pollution Charges, Fees, and Taxes’ Available online: http://yosemite.epa.gov/ee/epa/eed.nsf/2602a2edfc22e38a8525766200639d0f/e0b6a259b4e16cbb8525777d000cbb0b!OpenDocument
The effectiveness of pollution charges and fuel taxes is highly dependent on local institutional capacity to design, implement and monitor such instruments. Box 9 sets out the specific requirements underpinning a successful scheme.

Gaining political support for a scheme is essential and may be challenging in situations where the largest polluters are also important employers. The introduction of pollution charges is often easier where complementary regulatory regimes already exist, for example, where discharges are already monitored as part of regulations, and the administrative requirements of the new charge can build upon those of the existing regulatory regime.

An effective revenue collection and distribution system is required to ensure that the revenues received are used for the intended environmental rehabilitation/clean up. Agreement must be established concerning how the revenue is collected and spent. In general, revenue from the charges can be used in two main ways:

1. The revenue can be specifically allocated for paying for the cost of pollution clean-up or other environmental actions; or
2. The revenue can be centrally collected and used to pay for government priorities, which may not focus on environmental actions.

This instrument requires buy-in from the regulatory and monitoring/implementing body. It may be necessary to implement new legislation such as an environmental statute when establishing the scheme. It may also be necessary to provide the monitoring/implementing body with new authorities to support the discharge of their duties. Typically charges and fees are established by environment protection bodies and reviewed and monitored by environment committees and sub committees.

With the necessary enabling environment, it is possible to successfully apply pollution charges. A key strength of the instrument is that charges can be proportional to the pollution level and tailored towards specific pollutants. A weakness of the instrument is that it is not well-suited to addressing multiple sources of pollution in a given location. In addition, monitoring and enforcement of these instruments can be costly.

### 3.3 How It Works in Practice

#### 3.3.1 Financial

Firms are liable to pay the charge if they cannot economically reduce the volume of pollution they discharge. The broader community benefits from improved environmental outcomes; however, consumers may experience higher prices, if firms choose to pass on the pollution charge.

As illustrated by the Chinese Levy example, a levy system can be applied to an extensive number of sources of air, water, solid waste, and noise pollution. The revenues collected as levies can be used to finance environmental institutional development, administration, and environmental projects, and to provide subsidies or loans to pollution control projects implemented at the firm level.

Additionally, charges that are set at the right level to significantly change behavior can result in significant revenue transfers to the collecting body/government.

#### 3.3.2 Co-benefits

Multiple objectives can be achieved using this instrument and existing schemes have proven results in achieving environmental benefits. In addition, the taxes are revenue raising which can then be used for schemes that benefit the environment. A key co-benefit of the instrument is that it can stimulate technological innovation in pollution control by incentivizing firms to invest in new technologies in order to avoid incurring penalties. In addition, the revenues raised through the implementation of the instrument can be used to fund other policy objectives.

#### 3.3.3 Challenges

Some of the potential risks and challenges that may be encountered in applying this instrument are presented in Box 10.
3.4 Case Studies
The following case study examples illustrate applications of the instrument in different nations.

Box 10: Risks in Establishing and Operating Pollution Charges

1. Lack of, or insufficient, data available on the damage caused by pollution which can vary from one location to another depending on factors such as the location of the population at risk, prevailing wind, sunshine, temperature.

2. Challenging to set the pollution charge at the appropriate level to encourage desired behavioral change

3. Political opposition to large revenue transfers from pollution sources (the firms) to the authority imposing the tax (government)

4. Pollution can be difficult to measure and it can be costly to implement monitoring schemes, for example in the case of a solid waste collection charge

Box 11: Emission Fees in China

China has the most comprehensive emission charge system in the developing world. Results from an analysis of the system indicate that the instrument has been effective in decreasing pollution. The Chinese Levy System was implemented when China’s State Council began nationwide implementation of pollution charges in 1982. The system is applied to an extensive number of sources of air, water, solid waste, and noise pollution. Implementation has been widespread and the number of firms participating, and the revenues collected, have increased year on year.

The revenues collected as levies are used to finance environmental institutional development, administration, environmental projects, and to provide subsidies or loans to firm-level pollution control projects. Enforcement is implemented via a schedule of penalties. The levy has been particularly successful in managing air and water pollution. Key results of the scheme include:

- Pollution discharge intensities have been highly responsive to this instrument.
- For air pollution, the results suggest that emissions decline by about 0.65% for each 1% increase in the effective levy rate. Water pollution declines by 1.08% for each 1% increase in the levy.

Lessons Learnt
In an attempt to curb pollution from factories, the government set up an emissions fee which was deductible from taxes as a business expense. In addition, a rebate system was implemented whereby 80% of a firm’s pollution charges were returned for investment in pollution controls. This created a disincentive for firms to invest in pollution controls lest they lose the privilege of paying emissions fees and gaining the rebate. The government replaced the rebate with loans in an attempt to solve the problem; however, enforcement has been weak.

This example underscores the importance of matching policy designs with institutional capabilities. Any rebates offered must be tied to upgrading pollution controls.

3.4.1 Wastewater Discharge Charge – An Application of a Pollution Charge

The overall objective of wastewater discharge charges is to solve the problem of excessive water pollution. Discharge charges make the polluter (in this case the wastewater industry) pay for the external costs they impose on society. In doing so, this instrument can help improve environmental quality by providing economic incentives to reduce the volume of wastewater produced.

**Box 12: South African Wastewater Discharge Scheme**

In South Africa, the Department of Water Affairs (DWA) has been developing and piloting the WDCS to promote waste reduction and water conservation. The WDCS is based on the polluter-pays principle and aims to:

- Promote the sustainable development and efficient use of water resources
- Promote the internalization of environmental costs by polluters
- Create financial incentives for dischargers to reduce waste and use water resources in a more optimal way
- Recover the costs associated with different water treatment and water quality management programs

Many municipalities also impose charges to cover the costs of their own water treatment programs (i.e. as part of tier three pricing). The municipalities of eThekwini and the City of Tshwane, for example, have introduced further sanitation charges for wastewater discharges that exceed the pollution load of normal wastewater.

The WDCS scheme was developed drawing on key insights from international experience and understanding of the challenges faced locally in a South African context. The scheme is run as an adaptive management system that seeks to rehabilitate and manage the local water quality problems experienced by finding mechanisms to support existing water management initiatives, as opposed to just the introduction of polluter charges. The approach taken makes allowances for administrative, financial and institutional frameworks.

There are two charges associated with the WDCS:

1. Waste Discharge Levy (WD Levy): Charges that provide a disincentive or deterrent to the discharge of waste, based on the use of the resource as a means of disposing waste.

2. Waste Mitigation Charge (WMC): Charges to cover the costs of measures to mitigate waste discharge related impacts.

The DWA is responsible for the national roll-out of the WDCS. National Treasury, together with DWA, retains oversight to ensure good governance and appropriate fiduciary management. Catchment Management Agencies (CMAs) are responsible for implementation, including planning, identifying dischargers, invoicing, debt collection and financial management, disbursement, and monitoring and evaluation. The DWA implements the charge in cases where there is no CMA.

Implementation of the WDCS requires:

- That all municipalities (and any other direct discharger) will have to pay to discharge treated effluent to any watercourse.
- Process control and other operations at all wastewater treatment works are effective and reliable. Monitoring of the receiving water environment to determine any detrimental impact from the discharge.
- Updates, modifications or revisions of the sewage disposal bylaws that were in force prior to the implementation of the WDCS. Although the previous municipal bylaws included the polluter-pays principle via the right to recover costs related to objectionable discharges by a polluter, these clauses in the bylaws had to be drawn out more strongly. Furthermore, the bylaws must give the Municipality sufficient powers to investigate and identify the actual source of any objectionable discharges into the sewers, thus ensuring it is the actual polluter who pays for any activity that leads to additional (Tier 2, 3 and 4) deterrent charges.


Properly implemented and managed discharge charges can encourage the desired behavioral changes from waste dischargers, namely abatement of pollution at source, recycling of waste streams and wastewater, reuse of water, water conservation and return of water to its source. The charge may also generate revenue which can be used to support environmental monitoring and enforcement activities, or finance other government policies.

Wastewater discharge charges take two principal forms:

1. A charge on the volume of wastewater discharged, at a rate determined on the basis of the discharge volume, or

2. A charge on the contents of pollutants in the wastewater discharge, at a rate determined on the basis of ‘pollutant units’ in the wastewater discharge, such as concentration of oxygen-consuming substances and heavy metals.

There are few examples of such schemes in African cities, other than the Wastewater Discharge Charge Scheme (WDCS) in South Africa, which is still in its pilot phase. However, the experience from elsewhere suggests that such schemes have the potential to be implemented more widely in African cities, particularly where large industries are present and where it is evident that these industries are contributing to poor urban water quality as a result of discharges.

### 3.5 Links to Further Information

Further guidance can be found at the following links:

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<tr>
<th>Resource</th>
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<td>Fox and Edminston (2000) User Charge Financing of Urban Public Services in Africa</td>
<td><a href="http://core.ac.uk/download/pdf/7134417.pdf">http://core.ac.uk/download/pdf/7134417.pdf</a></td>
<td>Reviews user charge financing of public services, including an extensive discussion of past examples of user charge financing in Africa, consideration of revenue and equity implications, and a case study of water supply services in Egypt.</td>
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<tr>
<td>WaterAid (2011) Reaching the urban poor: supporting utilities to engage communities in service extension</td>
<td><a href="http://www.wateraid.org/what-we-do/our-approach/research-and-publications/view-publication?id=390ce0b4-2c43-4895-b8b7-b0c6e161cf30">http://www.wateraid.org/what-we-do/our-approach/research-and-publications/view-publication?id=390ce0b4-2c43-4895-b8b7-b0c6e161cf30</a></td>
<td>Outlines possible reform of water utilities in the developing world, in order to expand service coverage to the urban poor.</td>
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## IV. TAX EXEMPTIONS ON ALTERNATIVE FUELS

### TAX EXEMPTIONS ON ALTERNATIVE FUELS

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**Targets**  
Seeks to incentivize transition away from traditional biomass fuel for cooking and lighting towards cleaner, more sustainable fuel sources. This may help reduce the rate of deforestation as well as addressing air quality and associated public health risks.

**Type of instrument:** Fiscal instrument: tax exemptions

**Key considerations**  
- Long term financing through tax exemptions can prove costly
- Instrument may have greatest uptake amongst better-off households and limited uptake amongst poor households

**Key stakeholders**  
Government, importers, distributors, retailers and consumers

**Case study examples:**  
- Uganda
- Senegal

### 4.1 Overview

Access to modern fuels e.g. Liquefied Petroleum Gas (LPG), natural gas, biogas or electricity, is an indicator of development. Approximately 730 million people in sub-Saharan Africa continue to rely on traditional fuels e.g. solid biomass or charcoal, for cooking, typically used on inefficient stoves in poorly ventilated indoor space. Kenya, Tanzania, Nigeria, Ethiopia and DR Congo account for almost 50% of this figure. A large percentage of households using biomass fuel are rural, however, urban usage of charcoal is increasing. Studies suggest that even with access to modern fuels, households may continue to use traditional cooking methods due to financial constraints and / or cultural reasons.

Applying tax exemptions on alternative fuels is a way to encourage consumers to shift away from fossil fuels towards less polluting fuel sources for their household energy use. By setting different tax rates for different fuels to reflect their relative environmental benefits (or costs), consumers can be encouraged to shift to alternative fuels.

There are several ways of subsidizing transitions to cleaner fuel alternatives, including:

- Grant-based subsidies, which offer soft loans or direct financing; and
- Tax-based subsidies, which can be structured as tax credits, tax breaks, tax exemptions or tax differentiation.

Multiple objectives can be achieved using a tax exemption instrument and existing schemes have proven results in achieving environmental and health benefits. Results from Senegal illustrate the success of LPG in displacing firewood used by urban populations and a substantial reduction in charcoal consumption. The instrument can lead to several co-benefits including reduced deforestation rates and, as a consequence, potentially improving water quality and reducing flooding.

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2. Ibid
3. Ibid
With the necessary enabling environment, including the requisite retail buy-in, zero VAT schemes could lead to a successful outcome in other African nations.

4.2 How the Instrument Works

The widespread use of firewood and charcoal for cooking fuel in African cities has contributed to air quality degradation, unsustainable forest use and human health problems through smoke inhalation\(^4\). LPG is an alternative fuel source that has relatively high combustion efficiency and emits relatively few pollutants; 1 kg of LPG produces the same amount of energy as 2.5 kg of charcoal when used with an improved stove. Depending on the type of woodfuel, charcoal production, and stove used, approximately 7 to 30 kg of wood would be required to provide the same amount of useful cooking energy found in 1 kg of LPG\(^5\). LPG is available in African cities, but it tends to be prohibitively expensive for low income households, so uptake by these households is relatively low.

Value added tax (VAT) is a commonly applied consumption tax applied to fuel. By removing the VAT on a less environmentally damaging fuel type such as LPG, national governments forfeit tax revenue and the tax saving is, in theory, passed on to the consumer which makes the fuel more affordable and encourages consumers to use less environmentally damaging fuels. This instrument requires careful monitoring to ensure that the tax saving is passed on to consumers and not absorbed by the company supplying the fuel.

Tax exemptions of alternative fuels can also be used to encourage the adoption of solar equipment and accessories such as deep cycle batteries.

4.3 How It Works in Practice

A key challenge in the transition to cleaner fuels is the challenge of overcoming strong cultural attachment to cooking with woodfuel amongst many communities in sub-Saharan Africa.

Users of more traditional forms of fuel may be reluctant to switch to alternative fuels because low income households often rely on woodfuel, which is either free or very low cost and is readily available. In addition, switching to LPG would require that these households acquire different stoves. Therefore, the implementation of the instrument is likely to more successful when offered in conjunction with a scheme to subsidize cooking stoves for low income households.

The success of this instrument is dependent on several factors including:

- Cultural and social context;
- Accessibility and proximity to the fuel source; and
- Household income.

The following summarizes the considerations that have arisen through the implementation of tax exemptions on alternative fuels around the world.

4.3.1 Financial

Under this instrument, the government forgoes tax revenue from a given fuel type and the saving is passed on to consumers to support the switch to less environmentally damaging fuels. However, to be successful, this instrument needs to be accompanied by careful monitoring and adequate institutional capacity to ensure that fuel suppliers pass on the tax saving to consumers in the form of lower fuel prices.

Lessons learnt from the Ugandan case study suggests that conducting a cost benefit analysis prior to implementing the instrument is crucial to understand if the instrument offers sufficient environmental and health gains to offset the reduction in tax revenue for the government.

In the case of a scheme involving LPG, it is also critical to understand the extent of the LPG market and the geographical spread of LPG retailers. This is because decisions relating to energy consumption and fuel type are strongly influenced by accessibility, affordability and the convenience of the fuel\(^6\). Zero VAT schemes have been successfully implemented in several African nations. However, many barriers exist for poorer communities in accessing LPGs, including low income, poor infrastructure for distribution of the LPG and inadequate financing mechanisms to encourage private investors and implementation of credit facilities.

4.3.2 Co-benefits

By encouraging a reduction in the use of wood fuel, this instrument can reduce the time spent collecting wood fuel and contribute, in part, to a deforestation strategy.

4.3.3 Challenges

Risks that threaten a transition to cleaner cooking fuel include the price competitiveness of the fuel in

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\(^5\) BMZ (2013), Multiple-Household Fuel Use – a balanced choice between firewood, charcoal and LPG

\(^6\) BMZ (2013), Multiple-Household Fuel Use – a balanced choice between firewood, charcoal and LPG
comparison to traditional sources, technological issues, lack of infrastructure, lack of information and socio-cultural issues. In practice, national governments may need to adopt a number of policies to achieve the desired change in fuel use. These may include:

- Creation of clean cooking fuel initiatives at national level;
- Introduction of financial instruments to address economic barriers to clean cooking fuels; and
- Public education and awareness programs

### 4.4 Case Studies

The zero VAT on LPG approach has been adopted in a number of countries including Uganda, Senegal, Botswana and India. The following case study examples illustrate applications of the instrument in different nations.

**Box 13: Case Study of Tax Exemptions on Alternative Fuels, Uganda**

Between 2005 and 2006, 78% of Ugandan households depended on firewood and 18% depended on charcoal for cooking. Charcoal was mainly used in urban areas while firewood was more prominent in rural areas. Overall, 96% of the households depended on wood fuel for cooking. The Ugandan government was motivated to encourage poorer households to switch to LPG to achieve improved human health outcomes and human development. By implementing a zero VAT scheme on LPG, the government forfeited revenue worth USh3.4 billion, equivalent to US$2.1 million, the first year of implementation.

Initial analysis of the scheme highlighted challenges in establishing access to LPG by the rural poor, since retail outlets had not expanded beyond urban areas. Secondly, the retail prices for LPG did not decrease after the removal of the VAT. This suggests that the importing companies benefited from the removal of VAT more than consumers.

Lessons learnt from the scheme were the importance of identifying, before implementation, whether poor households can afford LPG even with zero VAT applied. In the Uganda case it was found that the tax exemption was not sufficient to stimulate demand from the poor because the cost of even the smallest LPG cylinder was still beyond the reach of the very poor.

Source: Kazoora, C. et al. (2009) Economic Instruments for Promoting Sustainable Natural Resource Use, Environmental Sustainability and Responses to Climate Change.
Evidence from a zero VAT scheme implemented in Senegal indicates that widespread use of LPG can reduce deforestation and improve the quality of life for poorer households.

Senegal initially implemented an LPG program in 1974, at a time when wood fuel consumption accounted for approximately 90% of energy use. This high level of dependency on wood fuel was negatively impacting the country’s natural forest. It was also a time-intensive burden to women who spent a large portion of their time collecting firewood.

The LPG program was implemented with the introduction of 2.75 kg capacity gas bottles, on which all import duty was removed on the bottle and corresponding cooker. Initially the gas was not subsidized, however, in 1976 the Senegalese Government elected to subsidize the 2.75 kg gas cylinders and withdrew tax exemption on imported equipment. In 1983, in response to the needs of large families, a larger cooker model, the Nopale was introduced in Senegal, adapted to fit a 6 kg capacity cylinder.

Problems arose with the subsidies, as by 1998, LPG had penetrated households of both poor and rich families and by 1994, subsidies had risen to a high US$10 million. Using subsidies in Uganda has been a considerable expense to the government. However, positive environmental outcomes have been achieved as deliveries of wood fuel in Dakar declined while LPG deliveries rose.

According to estimates from the Senegalese Ministry of Energy, the growth in LPG use resulted in annual savings of approximately 70,000 tons of wood fuel and 90,000 tons of charcoal since the program commenced.

Source: Kazoora, C. et al. (2009) Economic Instruments for Promoting Sustainable Natural Resource Use, Environmental Sustainability and Responses to Climate Change

### Box 14: Case Study of Tax Exemptions on Alternative Fuels, Senegal

Evidence from a zero VAT scheme implemented in Senegal indicates that widespread use of LPG can reduce deforestation and improve the quality of life for poorer households.

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<td>a balanced choice between firewood, charcoal and LPG</td>
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<td>Natural Resource Use, Environmental Sustainability and Responses to</td>
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V. DEPOSIT-REFUND SCHEMES

DEPOSIT-REFUND SCHEMES

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**Targets**

Inappropriate disposal of recyclable solid waste and hazardous waste, e.g. lead acid batteries. It aims to reduce the prevalence of litter and associated health and environmental risks at the consumer level, and sustainability within product life cycle at producer / manufacturer level

**Type of instrument:**
Market Based Instrument: Deposit Refund Scheme

**Key considerations**

- Only applicable to certain products;
- Administrative and compliance costs can be high *;
- Not typically intended to raise revenue

**Key stakeholders**

Manufacturers of beverage containers, distributors, retailers, consumers, local government.

**Case study examples:**

- Laos; South Africa, Mexico
- Multiple European examples

* In comparison to alternative options

5.1 Overview

Market-based instruments (MBIs), such as charges, taxes and tradable emission permits can be successfully applied for environmental protection purposes. Deposit refund schemes (DRS) are a type of MBI that seek to address negative externalities that arise as a result of the inappropriate disposal of consumer products. The DRS is an example of a price-based MBI that combines a charge and a subsidy which together acts to encourage individuals to engage in recycling.

DRS are typically applied to items that end up as roadside litter, including plastic bottles, cans and glass. There are numerous health problems associated with uncollected litter, particularly in lower-income areas where waste collection services are often inadequate. Not only is litter aesthetically unattractive, it also has potential to become an environmental hazard.

The deposit return system offers policy makers a tool that can simultaneously:

- Target reduction in litter and associated health and environmental risks
- Be applied to alleviate problems of inappropriate disposal of solid waste and hazardous waste / toxic chemicals
- Offer the potential to reduce costs associated with the collection and redirection of improperly discarded waste back to the waste stream
- Achieve recycling objectives
For example litter can accumulate in street drainage systems, blocks water courses, attracting rats and acts as breeding grounds for disease carrying vectors.

The schemes take the form of a surcharge on a product at the point of sale of potentially polluting products coupled with a rebate or refund offered when the packaging or product is returned for recycling, thereby reducing the amount of recyclable material going into landfill or being inappropriately discarded through, for example, littering.

This instrument is flexible and can be applied to a wide range of consumer goods from acid lead batteries, small chemical containers, refrigerators and most frequently, beverage containers.

Their use on bottles and cans can be very effective in reducing the amount of such materials disposed of in the general waste stream. They can also contribute to solid waste management, although, because of their voluntary character and the low value of the returned items in exchange for deposits, they are generally not effective at addressing major environmental problems.

DRSs may be particularly relevant for developing countries due to the following factors:

- High administrative efficiency (through self-enforcement) of deposit refund is a significant advantage for countries with administrative constraints and limited enforcement capability;
- Low opportunity cost of labor in developing countries suggests that even small deposits can generate an active collection activity that would have both economic and environmental benefits; and
- Success in contributing to solid waste management

5.2 How the Instrument Works

Also known as an ‘advance deposit fee’, a deposit refund acts as a surcharge on a product when purchased, for example, a small additional charge on a bottle of soft drink or beer accompanied with a rebate when that bottle is returned. DRS combine a charge (i.e. the ‘deposit’) and a subsidy for disposal or recycling (i.e. the ‘refund’), of packaging or containers such as beverage containers and pesticide containers or products such as lead batteries. These systems may be implemented to discourage improper or illegal disposal which gives rise to external costs such as litter and also potential environmental and health risks.

Under the scheme, consumers of packaging or container materials are given the right to a refund if the waste product is returned to the seller, i.e. to an authorized recycling or reuse point. For this right the consumer pays a formal deposit at the time of the purchase, or pays a higher price for the product at the point of purchase. In cases where disposal of a product causes environmental damage, the deposit refund can take the form of a tax on inappropriate disposal. Such systems operate on the assumption that consumers require a financial incentive to recycle and will pollute without this incentive. Consumers who do not return the product pay a charge, whereas those who return the product receive a refund and are rewarded for behaving in an environmental responsible manner.

DRS can be designed in two ways:

1. **Downstream:** The downstream approach is the traditional approach where the refund is transferred to the consumer who has paid the deposit fee and has returned their used product for disposal or recycling.

2. **Upstream:** The upstream approach subsidizes the firms that collects and/or recycles the product. This approach typically has lower transaction costs and can help ensure that the products are actually recycled and not just collected and discarded. The upstream approach tends to involve a lump sum payment which can be used to establish recycling centers or to cover operating costs. This approach may work well in developing country scenarios where existing recycling infrastructure is less common.

Overall, the upstream approach may lead to better environmental outcomes than the traditional downstream approach.

The distinguishing feature of the DRS is that it has a disclosure mechanism; the implementing authority or company pays the refund when the potential polluter demonstrates compliance by returning the item that carries the refund, therefore reducing the need for monitoring of illegal disposal. The implementing authority’s role is to require companies to offer the DRS and provide a tax credit or deduction for each refund paid. Implementing authorities are typically the industry responsible for the production of the product, but can also be a government agency.

The instrument is targeted at incentivizing behavioral change at the producer, seller and the individual consumer level. When deposits are used to subsidize recycling operators the instrument is effectively operating as an advanced recycling fee.

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DRSs are compatible with the polluter pays principle and have high administrative efficiency because they require limited monitoring or collection costs, especially when they are operated by the companies that produce and sell the products that are the subject of the DRS.

California and Hawaii have undertaken a slightly different approach to the design of the DRS. Retailers collect deposits from final consumers and then transfer the collected deposits to distributors. Distributors, in turn, pay the deposits to the state government. Under this approach retailers and distributors are not responsible for collecting used containers and for returning refunds to consumers. Rather, consumers return used containers to redemption locations and receive refunds that come directly from the state-managed program. Under this system, all unclaimed deposits stay with the state. Two advantages of this approach are that unclaimed deposits can be drawn upon by the state to supplement environmental programs. Secondly, having centrally located redemption locations may lessen the burden on smaller retailers for storage space and maintenance of the system. This approach may also be appropriate in urban areas where capacity to operate schemes may be low.

5.3 How It Works in Practice

Voluntary DRSs for glass, paper, and plastic and the recycling of ferrous materials are well established in various parts of the world, including Laos and Mexico. DRS are in place in several African countries including Tanzania, South Africa and Kenya and have proven effective at reducing waste generation and diverting waste from landfill. In addition, they have the added advantage of being reasonably straightforward to implement and maintain.

The following summarizes the considerations that have arisen through the implementation of plastic bag levies around the world.

5.3.1 Financial

Product taxes are sometimes perceived as a type of fine and can result in unintended consequence of individuals illegally disposing of items to avoid payment. For example, when solid waste disposal is directly taxed, households and firms tend to seek alternative disposal options, which include burning and illegal dumping. The DRS avoids this problem by providing rebates for materials returned for recycling.

Initially, DRS may operate at a loss due to the costs of establishing collection processes and recycling centers, if these are not already in place. It should be noted that the greater the number of returning points the higher the overall system costs for handling, storage and transport of returned products. In time, the instrument can shift the burden of cost of disposal from general taxation to the manufacturers, distributors and consumers of the products.

A DRS approach also avoids the need for costly monitoring and enforcement and by imposing an up-front fee on consumption and subsidizing the cost of recycling, a deposit-refund may be able to efficiently control pollution. DRS are typically more effective than a product tax in incentivizing individuals to behave in an environmental responsible manner by offering a refund when the product is returned.

Under the DRS consumers will face higher prices for the same product; however, this will be returned to the consumer if the scheme is implemented using the downstream approach.

5.3.2 Co-benefits

DRS can potentially be associated with a number of co-benefits, including:

- Alleviating poverty through job creation associated with the establishment of recycling centers;
- Generating additional revenue (from unredeemed deposits) that may be used by government to achieve other environmental objectives;
- Reducing illegal dumping;
- Encouraging recycling and reducing the amount of waste sent to landfill;
- Raising awareness of the connection between consumer behavior and environmental degradation;
- Improving health from improved waste management.

5.3.3 Challenges

Establishing the appropriate deposit refund fee is an iterative process that may require multiple attempts to get the deposit refund high enough to stimulate uptake. This is especially the case in situations where there is limited information on the possible reactions of consumers to the scheme or the value of environmental damage caused by the product.

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5.3.4 Establishing a DRS

The implementation of a DRS needs to be accompanied by various measures including:

- Supporting legislation such as a waste management bill;
- Development of recycling infrastructure and viable recycling markets;
- Enforcement of the scheme;
- Education and awareness; and
- Political will.

Provision of recycling center(s) is essential and can be established through a combination of approaches, including through Public-Private-Partnership, Non-Governmental Organization intervention or corporate CSR sponsorship. For example, the Kampala Capital City Authority (KCCA) in Uganda, in conjunction with the International Finance Corporation (IFC), offered a concession to a private investor for the management of Kampala City’s solid waste treatment facility - the Kiteezi Landfill. NGOs can also play a key role in establishing and running recycling centers, for example, Wastedar, an NGO based in Dar es Salaam in Tanzania. Examples of private investment in recycling centers include Coca Cola, who through their community social responsibility program, has facilitated the setting up of seven plastic waste collection centers in Uganda.

5.4 Case Studies

The following case study illustrates the application of a DRS to rubber tires in South Africa.

Box 15: Case Study of Deposit Refund System in South Africa: Rubber Tire Recycling

The South African National Waste Management Strategy and the Waste Management Bill are based on the Polluter Pays Principle (PPP) and holds households and companies responsible for paying the costs associated with the waste that they produce*. The National Waste Management Strategy recommends that DRS are most suitable for products that are easy to identify and handle, feasible to re-use or recycle, require careful disposal and where co-operation is feasible between producers, retailers and consumers.

There are a number of private sector industry-initiated DRS in South Africa, that cover glass, plastic beverage containers and steel beverage cans. Under these schemes the consumer pays a deposit per bottle and receives a refund per bottle upon return to a retailer.

A tire recycling scheme was implemented in South Africa in response to the growing awareness of the scale of the illegal disposal of scrap tires and the environmental problems that they cause; For example, scrap tire piles are a reasonably common sight in urban areas in developing cities. These scrap tire piles are a fire hazard and can burn for lengthy periods releasing toxic chemicals. Abandoned scrap tires also act as breeding grounds for mosquitoes and can leach toxic chemicals into groundwater. Disposal of whole tires in landfills creates problems as the tires tend to rise to the surface.

The Recycling and Economic Development Initiative of South Africa (REDISA) Integrated Industry Waste Tire Management Plan was approved in 2012 by the Minister of Water and Environmental Affairs to tackle these problems. REDISA is an independent body that is separate from the tire industry. The tire management plan was implemented to deal with the extensive number of waste tires and to create income generating activities. Manufacturers and tire importers are charged a levy of R2.30 plus VAT on every kilogram of new rubber tire and the cost of waste tire collection is passed on to consumers. The revenue generated by the levy is used to subsidize the collection and recycling of the waste tires and acts as an incentive for consumers to return the tires to a location where they can be appropriately disposed. It is estimated that the plan will generate approximately 10,000 income-generating opportunities** and by mid-2014, more than 17,000 tons of used tires had been collected and diverted from landfill by REDISA***. As a result of the scheme, South Africa’s waste tire recycling rate has increased from 4% to 19% by the end of 2014.

* Department of environmental affairs, Republic of South Africa (2011) National Waste Management Strategy, available [online]
### 5.5 Links to Further Information

Further guidance can be found at the following links in the table below.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Link</th>
<th>Description of Resource</th>
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<tbody>
<tr>
<td>Panayotou, T. (1994) Economic instruments for environmental management and sustainable development. UNEP Environmental Economics Series Paper No. 16.</td>
<td><a href="https://www.cbd.int/doc/nbsap/finance/Panayotou1994EconInstEnvMgSusDev_199EcInsEnvMgSusDev.pdf">https://www.cbd.int/doc/nbsap/finance/Panayotou1994EconInstEnvMgSusDev_199EcInsEnvMgSusDev.pdf</a></td>
<td>Review of economic instruments used in environmental management and sustainable development. There is additional detail on the relevance to developing countries of developed country experiences with economic instruments, and a summary of developing country experience with economic instruments.</td>
</tr>
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VI. ENVIRONMENTAL FUNDS

ENVIRONMENTAL FUNDS

<table>
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<tr>
<th>This instrument addresses</th>
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<th>Air Quality</th>
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</table>

Targets
Funding challenges

Type of instrument:
Grant / funding instrument

Key considerations
- Start-up phase of EFs is a long and often politically charged process;
- EFs have limited capacity to measure the impact of investments, even though this is essential
- The announcement of the creation of EFs can generate unrealistic expectations, especially in the short term

Key stakeholders
Financial sponsors, governing body of fund (board or steering committee), trustees, implementing agencies & non-financial sponsors

Case study examples:
- Eastern Arc Mountains Conservation Endowment Fund, Tanzania
- Clean Water State Revolving Fund, USA
- Fund for the Protection of Water, FONAG, Ecuador
- Thai Energy Efficiency Revolving Fund

6.1 Overview

Environmental Funds (EF) are an innovative financial mechanism that can be used for funding biodiversity conservation and achieving positive environmental outcomes. EF have been established in more than fifty developing countries. The objective of EF is to provide long-term stable funding for projects that focus on environmental conservation or enhancement activities that would not otherwise be funded by the governmental or private sector. EF can offer donors a reliably managed channel to allocate funds for specific activities, over a long period of time. Transparency, accountability and sound financial management characterize the funds, making them a more attractive option than government schemes, in some scenarios.

There are four principal options for financing EF:

1. establishing an endowment fund;
2. a sinking fund;
3. a revolving fund; or
4. a combination of the three.

An endowment fund is defined as a fund that invests its capital and uses only the income from those investments to finance its activities. A sinking fund is characterized by the disbursal of its entire principal and investment income over a fixed period, for example, over ten years. Revolving funds are structured in way that allows regular financial contributions to be added so as to replenish the fund, for example, proceeds generated by a special tax ear marked for financing conservation programs. Money is received from donors through the collection of fines or other sources and is allocated on a grant basis.

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6.2 How the Instrument Works

EF are underpinned by four key components: capital, legal structures, a supervisory structure and a management structure. They tend to be implemented by independent institutions rather than government agencies and are frequently implemented as a method of managing financial resources earmarked for environmental purposes, for example, biodiversity conservation and the protection of wildlife, forests, climate adaptation and mitigation\(^2\). The funds are defined by their legal, governance and financial structures and their structure depends on their purpose, legal and political context, institutional capacity and donor requirements. EF are often perceived as an attractive option due to the ability of the fund to ring-fence the allocation of certain resources for environmental benefits. It is important to note that EF are not implementing agencies, rather they act as channels for sources of funding. The success of these funds is underpinned by stakeholder commitment and political support, effective operational structures and transparency in order to attract and secure financial and non-financial supporters.

The Conservation Finance Alliance offers a guidance document as a part of a tool kit for the establishment of EF\(^3\). It identifies the following key elements underpinning the effective establishment of an EF\(^4\):

- Financial commitment of a minimum of 10-15 years;
- Active government support for establishing a public-private sector partnership by setting up an independent foundation outside direct government control;
- Critical mass of individuals from diverse sectors of society working together to achieve conservation goals;
- Reliable, trustworthy legal and financial structures and supporting institutions in place (e.g. banking, auditing and contracting); and
- Diverse funding sources.

The key advantages of EF are their ability to:

- Manage large funds over an extended time period;
- Facilitate the planning of longer term conservation projects due to longer lifetime of the funds;
- Offer a reliable, steady source of funds that facilitates operation of projects and allows for long term planning;
- Support transparent decision making processes underpinned by participation of government and non-governmental representatives;
- Facilitate co-ordination of multiple stakeholders; donors, civil society and governments;
- Build capacity at a local level as funds are typically locally managed and designed to address small scale priorities at a community, regional or national level; and
- Support the leveraging of further funds.

EF do, however, have some drawbacks. A challenge with endowment funds is that they tie up funds for an extended period of time. There is also a risk that the existence of an EF could lead to reduction in funding of conservation projects from governments and donors. Finally, due to the long term nature of EFs, they are not designed to respond to short term environmental problems.

6.3 How It Works in Practice

The key requirements underpinning the establishment of new EF are as follows\(^5\):

6.3.1 Legal and Governance Arrangements

- **Governance:** EF are established as legally independent entities governed by a Board of Directors through Articles of Incorporation or Charters approved by government authorities.
- **Tax exemptions:** To be most effective, EF require tax exemptions to attract and maintain fund growth.
- **Legal framework:** EF require the establishment of and articles of incorporation that are governed by common law and civil law frameworks. Bylaws set the structure and define the operating procedure of the EF. Directors of the EF normally draft these bylaws and they are used to regulate the organization. The majority of EFs also establish agreements or Memorandum of Understanding between the EF and the relevant national government. This element is essential to the success of any EF scheme.

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\(^4\) Adapted from Conservation Finance Alliance ‘Environmental Funds Toolkit’ available [online] http://toolkit.conservationfinance.org/

\(^5\) Adapted from Conservation Finance Alliance ‘Environmental Funds Toolkit’ Further guidance is available [online] http://toolkit.conservationfinance.org/
6.3.2 Planning

- Includes undertaking needs assessments, developing a strategic plan and drafting a business and fundraising plan.

6.3.3 Funding

- EF raise money as endowment funds, sinking funds, revolving funds, or a combination of these three.
- Many EF have a permanent endowment that has been capitalized by grants from the national government and international donor agencies. EF may also manage sinking funds created through debt-for-nature swaps or revolving funds financed through specially designated ‘user fees or taxes that are earmarked for conservation.
- Financial needs assessments or feasibility studies undertaken during the planning stage can be used to determine the required level of funding.
- A diverse source of funding is critical to the long-term sustainability and viability of EF. The vast majority of funding for EF has been generated by national governments, multilateral and bilateral aid, large internationally oriented private foundations and in a minor number of cases, in-country philanthropy.
- Opportunities for income generation exist and include carbon offsetting projects and Payment for Ecosystem Services (PES) schemes (see Section 7).

Other considerations for establishing schemes include the structure of finance and administrative elements, investment management, and establishing an adequate monitoring and evaluation process. Developing a process for delivering grants is essential as this will inform how the money is spent and allocated effectively. Having a clear communication plan for communicating to potential donors, government agencies, local communities and other stakeholders is critical for establishing the legitimacy of an EF. Finally, two elements which ideally should underpin any EF activity are the implementation of an adequate monitoring and evaluation system to track the conservation outcomes and monitor the institutional capacity of the EF.

6.3.4 Financial

The majority of EF have three main sources of funding: multilateral donor agencies such as the World Bank and African Development Bank; bilateral donor agencies such as European governments and large private foundations. International non-governmental organizations (NGOs) also play a role in financing EF. For example, Conservation International and WWF have both funded and supported several EF. Additionally, host governments often offer financial or in-kind support. The Global Environment Facility (GEF) funds remain critically important to EF around the world, for example, GEF was (until 2011) the largest donor to African Trust Funds.

6.3.5 Co-benefits

In practice, EF have facilitated long-term biodiversity conservation through their ability to mobilize large financial resources. They have the capacity to be used to promote and support payment for ecosystem services (PES) schemes through generating awareness of PES and running training courses, funding PES schemes and investing in PES projects with favorable rates of return. EF could be used to finance PES schemes by allocating a fixed percentage of available funds annually to finance start-up costs for PES projects or stimulate the market by purchasing credits from an existing project. Numerous examples exist in South America where EF are financing Payment for Watershed Services (PWS) programs.

In addition, EF can also be used to buffer countries or organizations from some of the inherent risk around activities such as REDD+ programs. For example, a major barrier to trading in carbon in many countries is the risk involved. EF could assist the development of these types of programs by providing a buffer against this risk.

6.3.6 Challenges

There are some challenges associated with EF, including the risk of:

- Poorly managed grant making process limiting the disbursement of funds;
- Inadequate communication between the EF and stakeholders leading to poor implementation, monitoring and evaluation of funds and projects;
- Political influence over how funds are distributed;
- Existence of EF may result in reduced government funding being allocated to conservation efforts; and
- International donors being discouraged from investing in governments.

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6 RedLAC Capacity Building Project for Environmental Funds, 2010, Environmental Funds and Payments for Ecosystem Services
6.4 Case Studies

Environmental Funds have been successfully implemented in multiple developing countries in a variety of ways. This section sets out a selection of case studies focusing on Tanzania, Peru and the USA.

**Box 16: Eastern Arc Mountains Conservation Endowment Fund, Tanzania**

The Eastern Arc Mountains are a globally recognized biodiversity hot spot, with high levels of endemism. They are also an important source of water and hydroelectric power for many Tanzanians.

The Eastern Arc Mountains Conservation Endowment Fund is a trust fund that was established in 2001 as a joint initiative between the Government of Tanzania, the World Bank, the Global Environmental Facility, and the Fund’s Board of Trustees. It aims to provide reliable and long-term financing for community development, biodiversity conservation and applied research projects in the Eastern Arc Mountains of Tanzania. The Fund is managed by a Board of Trustees which provides policy guidance and oversight control of the Fund’s activities and operations. Fundraising is a key element of the Fund’s activities; amongst others, the Government of Norway has committed US$5,947,700 to the Fund over a five-year period from 2011. The Fund has the institutional and operational capacity to receive, manage and disburse monies from this and other commitments, and has therefore developed a reputation for transparency and good governance.


**Box 17: Clean Water State Revolving Fund, USA**

The Clean Water State Revolving Fund (CWSRF) was established in 1987 by amendments to the Clean Water Act. It is a financial assistance program that enables states in the USA to fund projects that address their highest priority water needs. The CWSRF is funded primarily by grants from the Environmental Protection Agency, with states contributing an additional 20%. These funds are loaned out at low interest rates, with money paid back into the Fund subsequently re-issued as new loans. By 2015, state CWSRFs had provided more than US$111 billion to communities and issued more than 36,100 low-interest loans.

The CWSRF provides loans for: construction of municipal wastewater treatment facilities and decentralized wastewater treatment systems; control of non-point source pollution; the creation of green infrastructure; and the protection of aquatic resources and public health.


**Box 18: Fund for the Protection of Water (FONAG), Ecuador**

A Fund for the Protection of Water, FONAG, was established in Quito, Ecuador in 2000. It is an example of a water endowment or trust fund. FONAG was created to focus on the conservation of water resources and was committed to finding solutions for the problems resulting from inadequate management of these resources.

The fund is the result of a contract between the Metropolitan Water and Sewerage Company of Quito (EMAAP-Q) and the international environmental NGO The Nature Conservancy (TNC). The fund is financed by Quito’s municipal drinking water and electrical utilities, a water-bottling company and a private brewery. Donations are also contributed by international and local NGO’s, governments and overseas development assistance. The funds support a range of conservation projects from educating children about sustainable water management to improving parks and protected areas.

The FONAG fund has successfully raised in excess of USD6 million and leveraged an additional USD7 million. The ‘Quito model’ is being replicated across other Latin American cities in Ecuador, Colombia as well as Peru.

In 2003, the Government of Thailand launched the Thai Energy Efficiency Revolving Fund (EERF) as part of its Energy Conservation Program. The EERF seeks to support investment into energy efficiency as a means of reducing Thailand’s GHG emissions. The fund was established to address key barriers to investment in energy efficiency that are present within the Thai financial sector. Investing in energy efficiency was perceived to be high risk with little demand, prior to the establishment of the EERF. However, the EERF has proven successful in obtaining private capital through low-interest loans to banks, which in turn finance energy efficiency projects with favorable interest rate loans. The Fund provides capital at no cost to Thai banks when it is used to fund energy efficiency projects.

The EERF is financed through levies on petroleum and has an annual income of approximately US$225 million. The financing model adopted by the EERF is simple and is easily replicable in other countries. Replicating this model in other applying the model in other economies would require:

- A revolving pool of funds from which to provide loans
- Agreement from the finance sector (banks and other financial institutions) to participate in the financing model;
- Commitment of a small number of staff from a government agency to establish the financing model and to carry out a small proportion of the work involved in assessing loan applications, administering loans and promoting the financing model.


### Box 19: Case Study of Thai Energy Conservation Promotion Fund

In 2003, the Government of Thailand launched the Thai Energy Efficiency Revolving Fund (EERF) as part of its Energy Conservation Program. The EERF seeks to support investment into energy efficiency as a means of reducing Thailand’s GHG emissions. The fund was established to address key barriers to investment in energy efficiency that are present within the Thai financial sector. Investing in energy efficiency was perceived to be high risk with little demand, prior to the establishment of the EERF. However, the EERF has proven successful in obtaining private capital through low-interest loans to banks, which in turn finance energy efficiency projects with favorable interest rate loans. The Fund provides capital at no cost to Thai banks when it is used to fund energy efficiency projects.

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### 6.5 Links to Further Information

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<tr>
<td>Conservation Finance Alliance (Undated, hosted online) Environmental Funds Tool Kit</td>
<td><a href="http://www.funbio.org.br/wp-content/uploads/2012/04/4-Fundraising-Strategies-for-Environmental-Funds.pdf">http://www.funbio.org.br/wp-content/uploads/2012/04/4-Fundraising-Strategies-for-Environmental-Funds.pdf</a></td>
<td>A toolkit offering a guide to the creation and implementation of new Funds, including legal documents, manuals, plans and communication materials. Offers best practices and fundraising guidance.</td>
</tr>
</tbody>
</table>
VII. PAYMENTS FOR ECOSYSTEM SERVICES

7.1 Overview

The term Payments for Ecosystem Services (PES) is used to describe schemes in which the beneficiaries, or users, of ecosystem services (see Box 20) provide payment to the stewards, or providers, of ecosystem services. PES has come to prominence in the past decade as a new, innovative and promising approach to environmental management. According to the OECD, there were already more than 300 PES or PES-like programs in place around the world by 2010 at national, regional and local levels. It works by providing an economic incentive for landowners or managers to protect the environment. Moreover, it has the potential to help raise new sources of sustainable finance where they may be severely lacking and to improve the efficiency of restoration, rehabilitation or conservation interventions. It can also help secure the flow of ecosystem services to the multitude of beneficiaries (often businesses and infrastructure operators) that rely on them. If properly designed and implemented, PES can also in some cases, contribute to poverty alleviation objectives².

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**Box 20: Ecosystem Services**

Ecosystem services, simply defined, are the benefits we derive from the natural environment. These include, for example, the provision of food, water, timber and fiber; the regulation of air quality, climate and flood risk; opportunities for recreation, tourism and cultural development; and underlying functions such as soil formation and nutrient cycling. Maintaining and enhancing ecosystem services – and restoring them where they have been lost or degraded – is increasingly recognized as essential for sustainable economic growth, prosperous communities and promoting peoples’ wellbeing.

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7.2 How the Instrument Works

In practice, PES often involves a series of payments to land or other natural resource managers in return for a guaranteed flow of ecosystem services (or, more commonly, for management actions likely to enhance their provision) over-and-above what would otherwise be provided in the absence of payment. Payments are made by the beneficiaries of the services in question. These could be individuals, communities, businesses or government acting on behalf of various parties.

The basic idea behind PES is that those who provide ecosystem services – like any service – should be rewarded for doing so. PES therefore provides an opportunity to put a price on previously un-priced ecosystem services such as climate regulation, water quality regulation and the provision of habitat for wildlife and, in doing so, brings them into the wider economy. The novelty of PES arises from its focus on the ‘beneficiary pays principle’, as opposed to the ‘polluter pays principle’. Figure 2 provides an illustration of the PES concept in relation to payments for watershed services.

It is important to recognize that land or resource managers may already be subject to regulation which, if properly enforced, could limit adverse impacts on ecosystem service provision. They may also undertake measures to protect and enhance services where this is in their best interests, for example, through reducing water usage to make cost savings. Many land or resource managers may also seek to protect or enhance ecosystem service provision in their role as custodians. PES schemes should therefore be carefully designed so as not to undermine existing stewardship on the part of land or resource managers.

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![Figure 7.1](https://via.placeholder.com/150)

**Figure 7.1** The PES Concept (© Conservation International)*

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* Note: need permission to reproduce this figure.

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Key concepts and principles underpinning PES

A widely quoted definition of PES is:

1. a voluntary transaction where;
2. a well-defined ecosystem service (or a land-use likely to secure that service);
3. is ‘bought’ by a (minimum of one) ecosystem service buyer;
4. from a (minimum of one) ecosystem service provider; if and only if
5. the ecosystem service provider secures ecosystem service provision (conditionality)^4

Drawing on this definition, it is possible to identify seven key principles, which should ideally underpin any PES scheme:

- **Voluntary**: stakeholders enter into PES agreements on a voluntary basis;
- **Beneficiary pays**: payments are made by the beneficiaries of ecosystem services (individuals, communities and businesses or governments acting on behalf of various parties);
- **Direct payment**: payments are made directly to ecosystem service providers (in practice, often via an intermediary or broker);
- **Additionality**: payments are made for actions over-and-above those which land or resource managers would generally be expected to undertake (note that precisely what constitutes additionality will vary from case-to-case but the actions paid for must at the very least go beyond regulatory compliance);
- **Conditionality**: payments are dependent on the delivery of ecosystem service benefits. In practice, payments are more often based on the implementation of management practices which the contracting parties agree are likely to give rise to these benefits;
- **Ensuring permanence**: management interventions paid for by beneficiaries should not be readily reversible, thus providing continued service provision; and
- **Avoiding leakage**: PES schemes should be set up to avoid leakage, whereby securing an ecosystem service in one location leads to the loss or degradation of ecosystem services elsewhere.

In addition, establishing the baseline position, i.e. the likely future provision of the relevant ecosystem services in the absence of the PES scheme, will be critical since this will allow for accurate monitoring which will, in turn, indicate the level of additionality being delivered, thus reassuring buyers that the requisite services are indeed being provided.

While these principles should inform the development of PES, in practice schemes may adhere to them to a greater or lesser degree. The literature on PES suggests that few existing schemes fulfil all these principles in practice and, as such, aiming for a ‘perfect’ PES scheme may create unrealistic expectations.

7.2.1 Opportunities for PES

PES schemes are most likely to emerge in situations where:

1. specific land or resource management actions have the potential to increase the supply of a particular service (or services);
2. there is a clear demand for the service(s) in question, and its provision is financially valuable to one or more potential buyers; and
3. it is clear whose actions have the capacity to increase supply (for example, certain land or resource managers may be in a position to enhance supply)^5.

By way of illustration, wetland restoration could achieve an enhanced level of ecosystem services and deliver downstream benefits to water utilities and others who are dependent on a reliable supply of clean water. Restoration activities could include creating buffer zones along rivers for wildlife and re-flooding wetlands to improve water carrying capacity. This might lead to additional ecosystem service benefits in terms of biodiversity, improved water quality and flood risk management. If the risk of downstream contamination is high, water utilities and other industries may be willing to pay upstream land managers to undertake wetland restoration and maintenance activities to reduce contamination where the costs of doing so are perceived to be lower than those that would be incurred by investing in more conventional water treatment works.

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7.2.2 Types of PES Scheme

PES schemes come in a variety of forms and there are numerous ways of classifying them. The most common typology arises from the distinction between the ecosystem services provided. To date, most schemes have focused on carbon sequestration and storage, biodiversity conservation and water (quality and quantity). PES schemes may also be classified in terms of the principal sources of funding, distinguishing between:

- **Public payment schemes** through which government pays land or resource managers to enhance ecosystem services on behalf of the wider public;
- **Private payment schemes**, self-organized private deals in which beneficiaries of ecosystem services contract directly with service providers; and
- **Public-private payment schemes** that draw on both government and private funds to pay land or other resource managers for the delivery of ecosystem services.

It is also possible to identify a fourth model which involves fiscal transfers from national or regional government to local government on condition that agreed conservation, restoration or enhancement objectives are achieved. The Public Redistribution Mechanism in operation in several states in Brazil offers an example of a fiscal transfer mechanism (see Box 21).

PES schemes may also be differentiated in terms of their payment types and whether payments are made in cash or kind. Some of these are shown in the table overleaf (see Table 7.1).

7.2.3 Scale of PES Schemes

PES schemes can be developed and operated at a range of spatial scales:

- **International**: examples include Reducing Emissions from Deforestation and Degradation (REDD+) whereby developing countries that are willing and able to reduce emissions from deforestation and degradation are paid by developed countries for doing so.
- **National**: for example Mexico’s national PES scheme (Pago por Servicios Ambientales) in which Mexico’s National Forestry Commission pays eligible landowners who are enrolled in the scheme (through 5-year renewable contracts) to carry out a series of conservation activities to protect or enhance the role of forests in providing hydrological ecosystem services, habitat for biodiversity or carbon capture.
- **Catchment**: for example, downstream water users paying for appropriate watershed management on upstream land. These schemes tend to be private-financed, for example where a water company pays upland land managers on behalf of its customers to implement certain measures designed to stabilize or improve water quality.
- **Local/neighborhood**: for example, a scheme whereby residents collectively fund a warden or environmental organization to manage local green space for biodiversity, landscape and recreational value.

7.3 How PES Works in Practice

For a PES scheme to work it must represent a win for both buyers and sellers. PES may be positive from a buyer’s perspective if the payments are less than those associated with any alternative means of securing the desired service. For example, it may be less expensive for a water utility to pay land owners for improved catchment management than to pay for additional water treatment. PES schemes may be positive from a seller’s perspective if the level of payment received at least covers the value of any returns foregone as a result of implementing the agreed interventions. For example, a farmer may be willing to engage in alternative or less damaging land management practices to reduce sediment and nutrient loading if the payments received at least cover the costs of doing so, including the costs associated with any lost agricultural production.

Take, for example, a change in farm management to focus on the provision of a greater range of ecosystem service benefits, for example through wetland restoration on existing cropland:

- the minimum PES payment would be generally expected to at least cover any (private) return forgone by the farmer as a result of reduced agricultural production;
- the theoretical maximum payment would be the cumulative value of additional ecosystem service benefits which would accrue to the buyer(s) (which might include flood risk attenuation, fresh water supply, habitat for wildlife etc., depending on the services the buyer(s) wished to purchase); however, many of these benefits are hard to quantify, and many are ‘produced’ by the same types of management intervention; so

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Ecological fiscal transfers act as an incentive to municipalities for biodiversity conservation and the provision of ecosystem services and are an example of a specific-purpose fiscal transfer. To bring accountability in the use of funds, the recipient states and local bodies are required to meet certain conditions. These conditions include a clear statement of the objective and how the funds will be spent to achieve the objective, with clear targets for achieving the objectives. Local governments must demonstrate that the funds are spent on a verifiable project with measurable ecological benefits. That is, grants must be linked to physical outcomes and are independently assessed using an accredited auditing and evaluation system.

The instrument provides a method for compensating the local and state public actors for their contribution to public ecological objectives; essentially the transfers redistribute public revenue from federal and regional governments to local governments. The mechanism also has the potential to be used to finance the establishment of other public services that have environmental benefits such as wastewater treatment facilities. For example, transfers could facilitate the construction of wastewater treatment infrastructure and other establishment costs, that local governments typically have trouble financing.

There are an increasing number of ecological fiscal transfer programs with schemes operating in Brazil, the USA, India, China, and South Africa.

In the case of Brazil, the central government has been financing conservation through ecological fiscal transfers since the 1990s. Recognizing that it is difficult for municipalities to generate income from conservation and related ecosystem services, a number of Brazilian States agreed to establish an ICMS Ecológico. The ICMS (Imposto sobre Circulação de Mercadorias e Serviços) is a tax on goods and services, similar to the value-added taxes in other countries. 5% of the revenues from the ICMS are distributed to municipalities with conservation units or protected areas or those that supply water to neighboring municipalities. The State allocates more revenues to those municipalities with the greatest amount of area under environmental protection. Essentially this means that local governments are compensated for land-use restrictions associated with conservation and the provision of ecosystem services, such as protected areas and watershed protection by providing them with financial incentives for conservation.

The instrument provides a method for compensating the local and state public actors for their contribution to public ecological objectives; essentially the transfers redistribute public revenue from federal and regional governments to local governments.

In order to implement the mechanism, some amendments to current state laws were necessary, including the addition of environmental indicators to the existing criteria for revenue sharing. Indicators are largely related to land use restrictions, such as protected areas within a municipality, but some States incorporated indicators related to environmental public services, such as degree of sanitation and of adequate waste disposal in the municipality.

The success of a fiscal transfer instrument depends on the following criteria:

- **Revenue adequacy:** the subnational authorities should have sufficient resources, with the transfers, to undertake the designated responsibilities.
- **Equity:** transfers should vary directly with local fiscal needs and inversely with local fiscal capacity.
- **Transparency and stability:** the schemes should be announced and each locality should be able to forecast its own total revenue (including transfers) in order to prepare its budget. Schemes should be stable for a minimum of 3-5 years to allow long-term planning at the local level.
- **Capacity building is extremely important in order to allow local organizations and firms to take over once the fiscal transfers have ended**

Sources of further information:

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<td><strong>Direct Cash Payments</strong></td>
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<tr>
<td>Individual performance-based payments</td>
</tr>
<tr>
<td>An output-based payment model that estimates the ecosystem services benefits generated by individuals or groups of households; payments are conditional upon the attainment of individual performance targets</td>
</tr>
<tr>
<td>Payments based on shareholding</td>
</tr>
<tr>
<td>Communities are mobilized through associations under which participating households buy shares. PES payments are allocated according to these shares.</td>
</tr>
<tr>
<td>Conservation dividends</td>
</tr>
<tr>
<td>If participating farmers fully embrace conservation guidelines (e.g. resulting in reductions in illegal charcoal-making or protection of watersheds) they receive an end-of-year “conservation dividend”</td>
</tr>
<tr>
<td>Revenue sharing</td>
</tr>
<tr>
<td>Local communities enter into partnerships with, for example, the managers of protected areas, to undertake certain tasks. In return, they receive a percentage of (for example) tourism revenue</td>
</tr>
<tr>
<td>Community grants through trust funds</td>
</tr>
<tr>
<td>Income from a PES scheme is used to establish an endowment fund that provides grants to assist local community groups in developing socioeconomic activities with positive environmental impacts and which provide alternative livelihood options</td>
</tr>
</tbody>
</table>

7.3.4 The Actors Involved in PES Schemes

Four principal groups are typically involved in a PES scheme:

- **‘buyers’**: beneficiaries of ecosystem services who are willing to pay for them to be safeguarded, enhanced or restored;
- **‘sellers’**: land and resource managers whose actions can potentially secure supply of the beneficial service;
- **‘intermediaries’**: who can serve as agents linking buyers and sellers and can help with scheme design and implementation; and
- **‘knowledge providers’**: these include resource management experts, valuation specialists, land use planners, regulators and business and legal advisors who can provide knowledge essential to scheme development.

It is important to note that some organizations could conceivably play different roles in different PES schemes.

For example, a wildlife charity might: sell ecosystem services in its role as a land owner or custodian; take on the role of intermediary to facilitate delivery of a PES scheme; buy ecosystem services on behalf of its membership; or provide knowledge and advice on appropriate management practices.

The way that buyers and sellers can be configured in scheme development can also vary. For example:

- **‘one-to-one’**: for example, where a company enters into a contract with a single major land-owner to provide enhanced carbon sequestration;
- **‘one-to-many’**: for example, where a water utility makes arrangements via a broker to pay many farm businesses for water-sensitive management practices in a key catchment;
- **‘many-to-one’**: for example, where multiple buyers together invest in the development and maintenance of urban green space; and
- **‘many-to-many’**: for example, where government pays farmers for sympathetic land management practices on behalf of the wider public.

For any of these configurations, an intermediary or broker may form a key part of the PES scheme and undertake various tasks including overall scheme administration. In particular, where multiple suppliers or buyers are involved, the intermediary may act on their behalf to arrange exchange and distribution of payments.

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**Figure 7.2** The Logic of Payments for Ecosystem Services

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7.3.5 Key Aspects of Scheme Design

The mode of payment is one of the key variables in PES design. A distinction can be drawn between ‘output-based’ and ‘input-based’ payments:

- **‘Output-based’ payments** are made on the basis of actual ecosystem services provided. For example, payments might be made for a certain level of carbon sequestration or a measured increase in biodiversity. In an ideal world, output-based payments would form the basis for all PES schemes.
- **‘Input-based’ payments** are made on the basis of certain land or resource management practices being implemented. For example, payments might be made for the creation and maintenance of buffer strips along watercourses or the restoration and upkeep of green spaces in residential areas.

A PES scheme based on input-based payments will only emerge if buyers are content that the specified management practices will indeed deliver the required ecosystem services. In practice, input-based payments are more common than output-based payments as ecosystem services. In practice, input-based payments would form the basis for all PES schemes.

A PES scheme can focus on more than one ecosystem service. Those services being sold are then described as having been ‘packaged’. Ecosystem services can be packaged in three distinct ways:

- **Bundling:** a single buyer, or consortium of buyers, pays for the full suite of ecosystem services that arise from the same parcel of land or body of water.
- **Layering:** multiple buyers pay separately for each of the ecosystem services that arise from the same parcel of land or body of water; layering is also sometimes referred to as ‘stacking’. For example, an area of wetland is restored and yields a range of saleable ecosystem service benefits. The carbon sequestration benefits are purchased by a business, the water quality benefits by a water utility, the flood risk management benefits by local government on behalf of downstream communities, and the biodiversity benefits by a wildlife charity on behalf of its membership. Although some examples of layered PES schemes exist, these remain somewhat hypothetical.
- **Piggy-backing:** in this case, not all of the ecosystem services generated from a single parcel of land or body of water are sold to buyers. Instead, a single service (or possibly several services), is sold as an umbrella service, whilst the benefits provided by other services accrue to users free of charge (i.e. the beneficiaries ‘free ride’). For example, a business pays an upstream land manager for riparian restoration work to reduce the downstream flood risk to its bankside facilities. These improvements simultaneously improve water quality, enhance recreational values and provide habitat for wildlife. However, no buyers are found for these additional services and the benefits they provide are received at no cost to end users.

7.3.6 Potential Sources of Funding

As noted above, some PES programs involve contracts between consumers of ecosystem services and the suppliers of these services. However, the majority of the PES programs around the world continue to be funded by governments and involve intermediaries, such as non-government organizations. In the latter case, there may be a need to identify additional sources of finance to cover the costs of designing and setting up the scheme. Alternative sources of funding may include microfinance (see Box 22) or involvement of the private sector (e.g. insurance or financial services providers – see Box 25).

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**Box 22: Exploring the Role of Microfinance in Promoting Activities to Enhance Ecosystem Service Provision**

There is potential for the funding to implement PES schemes to come from a range of innovative sources that are as yet relatively unexplored. One promising example is setting conservation outcomes as a condition for accessing agricultural microfinance. In Kenya, for-profit company F3 Life have set up an example of this form of ‘eco-credit’ microfinance in the southern Aberdare mountains. Participating farmers gain access to loans contingent on the implementation of a series of measures aiming to reduce downstream watershed degradation, including planting grass strips to prevent runoff and trees to help stabilize soil banks. Loans help the farmers upscale and increase productivity, and the linked conservation measures help more than offset the impacts of this increase in productivity. Whilst other institutions are averse to lending to impoverished smallholders without any credit history because of the perceived risks of repayment, F3 Life slowly builds up a profile of their clients’ reliability by starting with small loans of as little as $20. As clients repay loans, they gain access to greater financing with lower interest rates, but in coordination, the conservation measures tied to the loans increase. According to the scheme’s management, 95% of the administered loans have been repaid with full implementation of conservation measures.

7.3.7 Technical Issues

There are a number of technical issues that need to be addressed when designing and implementing any PES scheme. Some of the most significant of these are described below.

<table>
<thead>
<tr>
<th>Establishing the baseline</th>
<th>The baseline is critical as this facilitates monitoring which in turn is necessary to check that the services being paid for are actually being delivered. The baseline represents the likely future provision of the relevant ecosystem service in the absence of the PES scheme. This should take account of any existing (or anticipated future) regulatory requirements, as well as the impacts of climate change in future changes in commodity prices in so far as possible. At a minimum sellers would be expected to comply with regulatory requirements and so would only receive payments for service delivery that is additional to this.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issues of land ownership and property rights</td>
<td>For PES to work, it is necessary to establish land tenure or use rights. This may be challenging in places where property rights are not well defined; insecure land and resource tenure of many poor people remains a key obstacle to them participating in and benefiting from PES schemes. However, formal land title does not necessarily preclude PES from working. In Uganda, for example*, while proof of ownership is necessary to enroll in a carbon credit-funded forest restoration program, proof, can come in the form of a proper land title, or approval and endorsement by the local council. The key is to firmly establish ownership within the structures of the local community. Projects carried out on communal lands can also work, but require a different payment mechanism. For example, the Uganda Wildlife Authority’s (UWA) cooperative management framework shares 20% of all park entry fees with local communities. UWA has established Community Protected Area Institutions (CPIs) based on community leadership structures associated with local parishes. CPIs serve as an advisory body and liaison between the community and UWA. They help communities identify development projects of interest and then present project proposals to the Chief Park Warden who allocates funds to the districts to implement projects.</td>
</tr>
<tr>
<td>Deciding on the appropriate scale</td>
<td>PES can be implemented at a variety of scales. In some cases, the scale will necessarily be determined by the scale at which the benefits of the ecosystem service(s) in question accrue, for example, in the case of hydrological services from watershed PES schemes. Larger-scale schemes may offer economies of scale (e.g. in relation to transactions costs) and reduce the risk of leakage while smaller schemes may offer more flexibility, allow more targeted interventions and better prospects for engaging with individuals buyers and sellers. However, in some cases smaller schemes may not have a sufficient number of sellers to provide or maintain the required level of service.</td>
</tr>
<tr>
<td>Identifying the most appropriate interventions</td>
<td>It is necessary to identify and agree the specific interventions needed to achieve the scheme objectives. These may include ecosystem restoration, ecosystem rehabilitation, prevention of ecosystem conversion, prevention of ecosystem degradation, improved land management. This in turn requires that there is a demonstrable link between the interventions proposed and the ecosystem benefits of interest. The stronger the cause-effect relationship, the easier it is likely to be to attract buyers into a PES agreement.</td>
</tr>
</tbody>
</table>

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### Gaining acceptance from all parties involved

Stakeholder consultation and involvement is crucial for scheme success. It can help:

- improve scheme design and implementation
- build confidence in, and a common vision for, the scheme and
- increase the commitment and participation of stakeholders in its ongoing implementation
- This in turn requires early identification of the participants and partners critical for implementing activities and reaching objectives.

### Determining the price and willingness-to-pay

The appropriate level of payments need to be negotiated between buyers and sellers, perhaps facilitated by a broker. Ultimately, the price will reflect what the buyer is willing to pay and what the seller is willing to accept in return for delivering the service. Negotiations to establish price can take into account:

- the opportunity costs to the seller in terms of income foregone from alternative land use or land management practices, both now and in the future
- start-up and ongoing maintenance costs
- transactions costs, i.e. the costs associated with establishing the scheme
- the costs of alternatives, i.e. what would it cost to achieve the same benefit using a different solution.

### Aggregating buyers and sellers

An aggregation of buyers and sellers may be necessary to achieve certain thresholds. For instance, transactions costs may be reduced where it is possible to work with established groups rather than having to negotiate agreements with multiple individuals. Similarly, it is necessary to ensure that there is a sufficient number of sellers to provide and maintain the required level of service. On the demand side, there needs to be a sufficient number of willing buyers to cover the total costs of the scheme.

### Understanding the nature and significance of the risks involved

It is important that all stakeholders within a PES scheme understand the nature and significance of any risks involved and that appropriate mitigation measures are identified and built into scheme design as far as possible.

### Ongoing monitoring and evaluation

For schemes to succeed in the long-term, it is necessary to establish a monitoring framework, including indicators, to evaluate the impact of the activity over time.

#### 7.4 Case Studies

While there are numerous examples of PES schemes around the world, those that are documented tend to focus on carbon storage and sequestration, biodiversity and watershed services. The examples illustrate how PES can also be applied in an urban context and typically involves urban residents (or municipalities on behalf of residents, or water companies on behalf of its customers) paying upstream (often peri-urban or rural) land managers for activities that will enhance the supply of good quality water.
The EPWS program is a Payments for Watershed Services (PWS) scheme in the Morogoro region of the Uluguru mountains in Tanzania piloted by WWF and CARE. Before the scheme started in 2006, unsustainable farming practices and land use change in the Kibungo subcatchment were reducing water quality in the catchment through an average annual increase in turbidity of 5 NTUs (Nephelometric Turbidity Units). This reduction in water quality was imposing increased water treatment costs on two of the region’s largest urban industrial water users, Dar Es Salaam Water and Sewerage Corporation (DAWASCO) and Coca-Cola Kwanza Ltd. Subsequently, WWF-CARE facilitated the creation of a PES scheme whereby these major industrial water consumers would pay upstream sellers from Lukenge, Kibungo, Lanzi, Dimilo and Nyingwa villages to adopt more water-friendly agricultural practices. In coordination with a number of local groups including the Uluguru Nature Reserve (UNR) Office and Sokoine University of Agriculture (SUA), farmers from participating villages were paid to adopt a combined structural (including terracing), vegetative (including reforestation) and agronomic (including intercropping with fruit trees) approach to improve downstream water quality. Payments are administered on completion of a given set of conservation activities, and overseen by village governments who manage the relationship between farmers and the main urban users.

As a result of the scheme, sediment levels in the catchment have fallen and the productivity of participating farmers’ has increased over threefold in places, with the mean number of meals per day rising from one and a half in 2008 to three now.

One of the main challenges that the project encountered was engagement with smallholders in poverty. Many workers in the participating villages are landless or own less than 0.5 ha, over 65 years old, or do not possess sufficient labor power to implement the conservation measures which are subsequently rewarded. The project required the development of additional strategies for enabling the participation of these groups.

Empresa de Servicios Públicos de Heredia (ESPH), or Heredia Public Service Enterprise, is a private water company serving the city of Heredia in Costa Rica. The company was concerned about the potential impact of population growth in the demand region on water supply, especially during the dry season when groundwater becomes the only viable source. Informed by willingness-to-pay studies, ESPH added an extra charge to water bills for users in Heredia. The funds raised through this extra tariff are invested by the company in upland catchment protection and reforestation, which includes strategic planting in areas of high vulnerability. The results generated through this funding are vetted by professional foresters, and the scheme has successfully safeguarded the company’s future and mitigated risks to the city’s water supply.

Some of the important factors behind the scheme’s success include the guaranteed flow of funding as a result of the mandatory tariff added to all consumers’ water bills that allows for strategic planning and program security, and the funds generated by the scheme being transparently placed into a fund whose sole purpose is to invest in catchment conservation. This transparency helps minimize the threat of corruption or leakage. However, the scheme has also dealt with challenges. One of the predominant challenges is that the national regulatory authority did not accept the conclusions of the company’s WTP schemes and approved a mandatory tariff that was significantly lower than the company had determined users would accept. This has limited the extent of the funding available, constraining conservation efforts in the catchment.


Kwayu et al. (2013), ‘Farmer participation in the Equitable Payments for Watershed Services in Morogoro, Tanzania’

There are also some more sophisticated examples of PES-like schemes including developer contributions and credit trading schemes. While these may contain an element of ‘polluter pays’ in some circumstances, for example, where investments are made to offset environmental externalities elsewhere, they do nevertheless operate on the principle that land managers are rewarded for the ecosystem services they provide. An example of a credit trading program is provided below. Similar schemes are now in operation in hundreds of US cities.

### Box 25: Washington, D.C. Stormwater Retention Credit Trading Program

Stormwater run-off is one of the biggest and fastest-growing source of water pollution in Washington D.C. where up to thirteen billion liters of run-off and sewage flow into local rivers that course into the Chesapeake Bay estuary each year.

Because of this threat to local waterways, the nation’s capital is among more than 700 U.S. cities that are required by Federal regulation to invest in new infrastructure to manage stormwater runoff. The District has one of the country’s oldest sewage systems, which during moderate rain, sends untreated waste and pollution-laden run-off overflowing into the city streets and watershed. This severely degrades aquatic habitat and impacts industries within the Chesapeake Bay, North America’s most productive estuary.

Typically, stormwater management makes use of engineered infrastructure to compensate for a regulating ecosystem service that no longer works well in cities because so much area is built and paved over. Stormwater infrastructure in many places is easily overwhelmed as severe storms are becoming more frequent. The alternative to constructing more hard infrastructure is to re-create, or approximate, the processes nature uses to handle stormwater in the first place.

In 2013, the District Department of the Environment (DDOE) within Washington, D.C. adopted local stormwater regulations with an innovative trading program that allows property owners (including homeowners, churches and, businesses) who voluntarily implement green infrastructure that reduces stormwater runoff to earn credits. Developers who are required to manage stormwater runoff on projects, can then meet the regulatory requirements by purchasing credits from offsite designs that reduce stormwater runoff, like rain gardens, green roofs, permeable pavement and other green infrastructure practices. The idea is that by giving other properties throughout the district a financial incentive to trap runoff on their own land, the city can capture more “first flush” water—the initial rainfall that catches the most pollution—before it hits the rivers.

Investments in green infrastructure also provide a host of valuable co-benefits, including expanded green space, reduced localized flooding, and jobs to build and maintain green infrastructure sites.

For further information see District of Columbia Department of Energy and Environment: http://doee.dc.gov/
## 7.5 Links to Further Information

<table>
<thead>
<tr>
<th>Resource</th>
<th>Link</th>
<th>Description of Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payments for Ecosystem Services: Getting Started - A Primer</td>
<td><a href="http://www.unep.org/pdf/PaymentsForEcosystemServices_en.pdf">http://www.unep.org/pdf/PaymentsForEcosystemServices_en.pdf</a></td>
<td>Provides an introduction to the concept of Payments for Ecosystem Service (PES) and how PES deals work. It is intended for an audience interested in exploring the potential of PES — either as prospective PES sellers themselves or as staff of organizations that work directly with communities or landowners who may be interested in PES. Also provides guidance on conditions under which PES is most relevant and likely to succeed.</td>
</tr>
<tr>
<td>Introduction to Payments for Ecosystem Services: A Reference Book for Uganda</td>
<td><a href="http://www.katoombagroup.org/documents/cds/uganda_2011/Introduction%20to%20Ecosystem%20Services%20and%20Climate%20Change/Learning_About_ES_FINAL.pdf">http://www.katoombagroup.org/documents/cds/uganda_2011/Introduction%20to%20Ecosystem%20Services%20and%20Climate%20Change/Learning_About_ES_FINAL.pdf</a></td>
<td>Provides an introduction to the concept of PES as well as examples of different types of PES schemes. Includes detailed examples of PES transactions in Africa as well as information on where to find further support for the development of PES projects in Uganda.</td>
</tr>
<tr>
<td>Payments for Ecosystem Services: A Promising Tool for Natural Resources Management in Africa</td>
<td><a href="http://www.afdb.org/fileadmin/uploads/afdb/Publications/Publications/Payment_for_Environmental_Services__A_promising_tool_for_natural_resources_management_in_Africa__06_2015.pdf">http://www.afdb.org/fileadmin/uploads/afdb/ Publications/Publications/Payment_for_Environmental_Services__A_promising_tool_for_natural_resources_management_in_Africa__06_2015.pdf</a></td>
<td>Describes the potential role of PES in promoting the sustainable management of natural resources in Africa and how to build a robust approach to harnessing this potential. It focuses on three types of ecosystem service: carbon sequestration and storage, biodiversity conservation and watershed protection and includes a number of useful case studies.</td>
</tr>
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</table>
COMMUNITY BASED NATURAL RESOURCE MANAGEMENT

<table>
<thead>
<tr>
<th>This instrument addresses</th>
<th>Water Quality and Wastewater</th>
<th>Air Quality</th>
<th>Solid Waste</th>
<th>Flooding</th>
<th>Land Degradation</th>
<th>Deforestation</th>
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</table>

Targets
Unsustainable use of natural resources and unequitable access to natural resources can work towards promoting livelihood security and biodiversity conservation

Type of instrument:
Collective approach to managing resources

Key considerations
- Best practice examples are in rural areas. However, may have applicability in an urban setting
- Requires working closely with a local community and may require a lengthy period of time before benefits are realized

Key stakeholders
Local communities, non-governmental organizations

Case study examples:
- CAMPFIRE Program, Zimbabwe
- Kam’ywamba Community Integrated Natural Resource Management, Malawi

8.1 Overview
Community-based Natural Resource Management (CBNRM) is a bottom-up approach to conserving natural resources. It empowers local communities to take ownership and management of natural resources with a view to managing them sustainably. This is especially important in areas where natural resources underpin the livelihoods of low income households. CBNRM is achieved by transferring or partly sharing management responsibility, and including local communities in decision making processes. The central driver of CBNRM is the concept of shared management and the creation of an enabling environment that facilitates communities to take ownership of ‘their’ natural resources. The ultimate aim is to enhance conservation efforts and achieve sustainable and equitable use of natural resources.

Key principles underpinning the approach include:

- Decentralized decision making and power given to local communities
- Local communities are best placed to conserve natural resources;
- Individuals will conserve a resource if benefits exceed the costs of conservation; it is unrealistic to expect poorer communities to undertake conservation efforts that do not enhance their livelihoods or daily lives;
- Successful management of natural resources at a community level is based on a supportive, enabling policy and legislative environment
- Equitable and transparent sharing of any revenues earned is essential and has proved to be central to the success of many projects.

CBNRM has become a popular instrument amongst provincial and national governments, and there have been moves to integrate the approach into policies and strategies. Indeed, CBNRM became the dominant conservation and development paradigm of the 1990s and its principles have been adopted by international aid agencies and lending organizations across the world.

CBNRM requires long-term engagement, decentralized decision-making power, clearly defined objectives that are understood and agreed upon by participating communities, and tangible direct benefits. These benefits are financial or related to employment opportunities. Indirect benefits comprise capacity building and the up-skilling of communities, as well as opportunities to diversify local economies. There is also a need for multi-layered collaboration across NGOs, private sector investors, multi-lateral development banks, government institutions and technical service organizations.

8.2 How the Instrument Works

Successful CBNRM should bring about a number of outcomes, including the diversification of livelihood options in the use of natural resources so as to minimize risks in case of natural and economic disasters and the sustainability of a community’s natural resource base, to secure livelihoods for current and future generations. CBNRM is a complementary activity that supplements incomes and activities rather than being the main income generating activity. Essential to the success of any CBNRM scheme is the involvement of all stakeholders in the development and implementation of a scheme, including local organizations, local governments and community organizations and community involvement in the development and implementation of policies and laws (for instance, land tenure and distribution of benefits and resources). CBNRM can also facilitate local communities to introduce byelaws to regulate access to and use of a natural resource and set and collect user charges. In some scenarios, it also gives local communities power to penalize individuals who disregard byelaws.

8.2.1 CBNRM in Urban Areas

CBNRM is applicable as a tool to support environmental planning and management of the peri-urban environment. Increasing pressure from expanding urban areas has led to environmental degradation and created a need for environmental approaches like CBNRM in urban and sub-urban areas. The need for such approaches is especially pronounced at the peri-urban interface, where urban and rural land uses mix and often clash. Environmental impacts of particular concern in these urban and peri-urban areas include agricultural land loss and degradation, water resource exploitation, and waste disposal. CBNRM is an approach that can lead to the restoration of ecological balance in such degraded and fragile ecosystems.

8.3 How CBNRM Works in Practice

CBNRM offers locals an incentive to conserve natural resources by giving them power over these resources and a stake in any profits earned from them.

The introduction of CBNRM in Botswana (see Box 26) provides a number of valuable lessons on how CBNRM projects ought ideally to work. It generally requires an enabling policy and legal framework. For example, Botswana integrated the concept of CBNRM into two policy documents; the Wildlife Conservation Policy (1986) and Tourism Policy (1990). This created an enabling environment for the implementation of CBNRM approaches in Wildlife Management Areas.

Box 26: CBNRM in Botswana

The CBNRM strategy undertaken by Botswana has been hailed as an innovative conservation paradigm. Its success is attributable to a number of key enabling factors: the country’s legal structure, and policy and institutional environment; buy-in from local communities; the credibility of projects; and the building of mutual trust within communities. In addition, Botswana’s experience with CBNRM suggests that:

- Participation from community members at all levels, not just those traditionally in leadership roles, is a key element in successful CBNRM;
- Enabling factors must be in place before projects commence – there is no need to rush projects through to implementation. Although communities may be keen to get started and generate benefits, it is important to have key elements in place first both at a local scale and an implementing/institutional level; and
- Given the appropriate tools, training and enabling policy and legislative environment, communities can produce successful outcomes, improving both conservation efforts and community well-being.

8.3.1 Risks

Risks with CBNRM include community level conflicts over how resources are shared or managed and who profits from management interventions. High expectations and poor capacity building in local communities can lead to frustration, slow progress and ultimately projects not achieving their objectives.

8.3.2 Challenges

Challenges are largely context-specific, but in many parts of Africa informal land tenure is a barrier to CBNRM. Group ownership and territorial rights may be novel concepts for communities resident in target areas. Individual benefits can also be small as income is split between multiple households across communities.

8.4 Case Studies

There are a number of case studies of successful CBNRM from around the world. These include:

**Box 27: CAMPFIRE Program, Zimbabwe**

The CAMPFIRE program (Communal Areas Management Program for Indigenous Resources) is a program designed to value wildlife as a renewable nature resource. It allocates ownership of wildlife to indigenous populations.

At the height of the CAMPFIRE program, 60 rural district councils participated, resulting in villagers benefitting from trophy hunting, while others embarked on a number of income-generating projects such as meat cropping, fishing, Mopani worms sales and safari operations. Between 1989 and 2004, the program raised about US$30 million, which was ploughed back into communities, leading to improved wildlife management and better livelihoods.

Source: [http://www.fao.org/docrep/u5200e/u5200e06.htm](http://www.fao.org/docrep/u5200e/u5200e06.htm)

**Box 28: Kam’mwamba Community Integrated Natural Resource Management and Use Project, Malawi**

The Kam’mwamba community had experienced heavy deforestation from both commercial and local exploitation of 3000 hectares of indigenous forest. The Community Integrated Natural Resource Management and Use Project aimed to identify economic value in the indigenous forests and devise incentives through which the community could benefit from such value, while also conserving the forests. Economic value was identified in the harvesting and marketing of non-timber forest products. The success of the project demonstrated the benefits of sustainable livelihood and environmental management strategies that build on community resilience. It also showed that adaptive capacity lessens the vulnerability of the community to future climate change.

8.5 **Links to Further Information**

Further guidance can be found at the following links:

<table>
<thead>
<tr>
<th>Resource</th>
<th>Link</th>
<th>Description of Resource</th>
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### IX. APPENDICES

**Appendix 1: Potential Sources of International Finance to Support Green Urban Development Initiatives**

<table>
<thead>
<tr>
<th>Fund</th>
<th>Hyperlink</th>
</tr>
</thead>
</table>
| **Global Environmental Facility** | The Global Environmental Facility (GEF) provides grants and funding that assist in protecting the global environment and in promoting environmental sustainable development. It serves as a financial mechanism for five international environmental conventions:  
  - Convention on Biological Diversity (CBD)  
  - United Nations Framework Convention on Climate Change (UNFCCC)  
  - Stockholm Convention on Persistent Organic Pollutants (POPs)  
  - United Nations Convention to Combat Desertification  
  - Minamata Convention on Mercury  
  The Facility administers four trust funds: the Global Environmental Facility Trust Fund, Least Developed Countries Trust Fund, Special Climate Change Trust Fund, and the Nagoya Protocol Implementation Fund. GEF support for environmental sustainable development projects is provided to government agencies, civil society organizations, private sector companies and research institutions. | https://www.thegef.org/gef/whatisgef |
<p>| <strong>Green Climate Fund</strong> | The Green Climate Fund (GCF) mobilizes funding to low-emission and climate-resilient projects in developing countries, with an even split between adaptation and mitigation projects. Its funds are focused particularly on countries that are especially vulnerable to climate change: Least Developed Countries, Small Island Developing States, and African States. The Fund is an operating entity of the UNFCCC. | <a href="http://www.greenclimate.fund/the-fund/the-big-picture#mission">http://www.greenclimate.fund/the-fund/the-big-picture#mission</a> |
| <strong>Clean Development Mechanism</strong> | The Clean Development Mechanism (CDM) is a climate change mitigation instrument defined by the Kyoto Protocol. The CDM allows countries with an emission-reduction or limitation commitment under the Kyoto Protocol to establish emission-reduction projects in developing countries. Such projects generate certified emission reduction credits, which contribute toward Kyoto targets. Some 1,650 CDM projects have been started since the CDM’s implementation in 2006. | <a href="http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php">http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php</a> |</p>
<table>
<thead>
<tr>
<th>Fund</th>
<th>Hyperlink</th>
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<tbody>
<tr>
<td><strong>Climate Investment Funds</strong>&lt;br&gt;The Climate Investment Funds provide developing and middle income countries with concessional financing for projects that reduce greenhouse gas emissions and manage climate change. The CIF is comprised of four programs:&lt;br&gt;• Clean Technology Fund&lt;br&gt;• Pilot Program for Climate Resilience&lt;br&gt;• Scaling up Renewable Energy in Developing Countries Program&lt;br&gt;• Forest Investment Program&lt;br&gt;In total, these programs have US$8.3 billion ready for disbursement. Barnard (2015) suggests that the Clean Technology Fund is the most important actor in providing financing for urban projects.</td>
<td><a href="https://www-cif.climateinvestmentfunds.org/about">https://www-cif.climateinvestmentfunds.org/about</a>&lt;br&gt;Barnard, S. (2015) Climate finance for cities. [Online] Available from: <a href="https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9660.pdf">https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9660.pdf</a> [Accessed 11 May 2016.]</td>
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<td><strong>Sustainable Energy Fund for Africa</strong>&lt;br&gt;The Sustainable Energy Fund for Africa (SEFA) is a multi-donor trust fund administered by the African Development Bank (AfDB). SEFA supports small- and medium-scale renewable energy and energy efficiency projects in Africa. In particular, it aims to assist projects at an early stage of development that would not otherwise proceed to implementation because of initial development costs and a lack of start-up capital.</td>
<td><a href="http://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/sustainable-energy-fund-for-africa/">http://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/sustainable-energy-fund-for-africa/</a></td>
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<td><strong>Africa Climate Change Fund</strong>&lt;br&gt;The Africa Climate Change Fund (ACCF) is a trust fund hosted and managed by the African Development Bank (AfDB). The ACCF aims to assist African countries in transitioning to a climate-resilient and low-carbon development pathway, in particular by facilitating access to climate finance. ACCF grant recipients include African governments, non-governmental organizations, and research and regional institutions.</td>
<td><a href="http://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/africa-climate-change-fund/">http://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/africa-climate-change-fund/</a></td>
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<td><strong>Interact Climate Change Facility</strong>&lt;br&gt;The Interact Climate Change Facility (ICCF) finances renewable energy and energy efficiency projects in the private sector in developing countries and emerging markets. It will fund up to 75% of the total combined financing, providing between EUR 10 million and EUR 45 million per project. The authorised financial instruments used by the facility are Senior Loans and Mezzanine Debt.&lt;br&gt;The ICCF’s funding capacity is provided by Agence Française de Développement, the European Investment Bank (EIB), BIO (Belgium), CDC (United Kingdom), COFIDES (Spain), DEG (Germany), FINNFUND (Finland), FMO (the Netherlands), NORFUND (Norway), OeEB (Austria), PROPARCO (France), Sifem (Switzerland) and SWEDFUND (Sweden).</td>
<td><a href="http://www.edfi.be/about/iccf.html">http://www.edfi.be/about/iccf.html</a></td>
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