



## MAKING THE ECONOMIC CASE:

A Primer on the Economic Arguments for Mainstreaming  
Poverty-Environment Linkages into  
National Development Planning



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## Preface

The UNDP-UNEP Poverty-Environment Initiative (PEI) is a joint programme to provide financial and technical support to countries to build capacity for mainstreaming poverty-environment linkages into national development planning processes, such as PRSP's and MDG Achievement Strategies. The programme is supported by the Governments of the UK, Denmark, Sweden, Norway, Spain, Ireland, Belgium and the European Commission.

A major element of the PEI country work is to assist in “making the case” for integrating environmental management into national development plans, budgets and implementation programmes – using the argument that better environmental management contributes to poverty reduction, pro-poor growth and government finances. This primer is designed to help our country teams and others engaged in the environmental mainstreaming challenge to succeed in “making the case”.

We are very grateful to Lucy Emerton of IUCN who has written this primer. Various members of the UNDP-UNEP PEI team have contributed to its preparation, especially Paul Steele of the regional PEI team for Asia and the Pacific, and thanks are due to them.

The primer is meant to be a working document and be tested at the country level, with a view of getting feedback from country practitioners and improving its content. Any comments or enquiries should be directed to:

Facility.unpei@unpei.org  
UNDP-UNEP Poverty-Environment Facility  
UN Gigiri Compound, United Nations Avenue  
P.O.BOX 30552-00100, Nairobi, Kenya

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## Introduction: how making an economic case can help

Although there is a growing body of evidence that the environment is one of the core building blocks for pro-poor economic growth, this message does not always seem to have reached economic and development planners. In all too many cases “environmental sustainability” goals are seen as being distinct from– and sometimes even as conflicting with– “development” goals. In the face of pressing needs for economic growth and poverty reduction, and given the scarcity of public funds, the environment tends to remain a low priority in public investment and policy formulation.

With few exceptions, environmental managers face a continuing problem in “selling” their sector to macroeconomic and sectoral decision-makers. Traditional conservation arguments have rarely proved sufficient to make a compelling case that environmental sustainability has an important bearing on pro-poor growth. Economic evidence however provides an extremely powerful (although traditionally under-utilised) tool for persuading economic and development decision-makers to acknowledge the contribution of the environment to pro-poor growth, to buy into policies which encourage its sustainable use and management, and to ensure that adequate resources are invested in environmental goals.

A key concern is to effect a shift from the view that environmental sustainability is a luxury that governments cannot afford, to one where it is seen as a necessity that they cannot afford not to invest in. This requires using lines of reasoning and argument which are based on the goals and outcomes that matter to macroeconomic and sectoral decision-makers, in terms that are familiar to them– such as effects on productivity, output, earnings, employment, public revenues and expenditures, the incidence of poverty and rate of economic growth.

Although the use of economic arguments represents a new approach for most environmental managers, it is becoming more widespread– and there are already indications of success. For example:

- In Cambodia, the Fisheries Department undertook research showing that their sector contributed 10 percent of Gross Domestic Product– a very high figure. This evidence was instrumental in persuading the Ministry of Finance to prioritise the fisheries sector in budget allocations, and in dialogues with overseas donors.<sup>1</sup>
- In Algeria, presentation of data on the economic costs of environmental degradation to high-level political decision-makers led to new investments of around \$450 million being made in environmental protection.<sup>2</sup>
- In Namibia, an economic analysis of the benefits of wildlife tourism to the wider economy resulted in the Government increasing budget allocations to Protected Areas by just under a third.
- A new OECD review and analysis of economic arguments for the improved management of environment and natural resources in national development planning presents a number of examples of how the economic case has been made.<sup>3</sup>

This primer provides guidance on presenting evidence about the economic, development and poverty reduction benefits of the environment to public sector decision-makers, so as to justify and promote “environmental investment”. Environmental investment is taken to mean the effort, attention and material support accorded to environmental sustainability in public budgets, policies and planning. This includes ensuring that sufficient government funds are allocated to the agencies responsible for environmental management and conservation; that environmental goals are prioritised and incorporated into (and not undermined by) macroeconomic and sectoral policies and the instruments that are used to achieve them; and that economic and development projects and programmes factor environmental costs and benefits into their calculations, and do not impact negatively on the environment.

### Summary of this document

Section 1 provides guidance on how to frame the economic argument for environmental mainstreaming. Section 2 presents examples of the ways in which the environment contributes to pro-poor growth, and gives guidance about the kinds of data that can be presented as evidence. Section 3 summarises the data requirements for making the economic case for environmental investment. Section 4 provides advice on accessing information about the economy and environment. Section 5 outlines strategies for packaging and communicating evidence in a form that is credible and convincing. Section 6 presents a glossary and lists key references on the links between the environment and pro-poor economic growth.

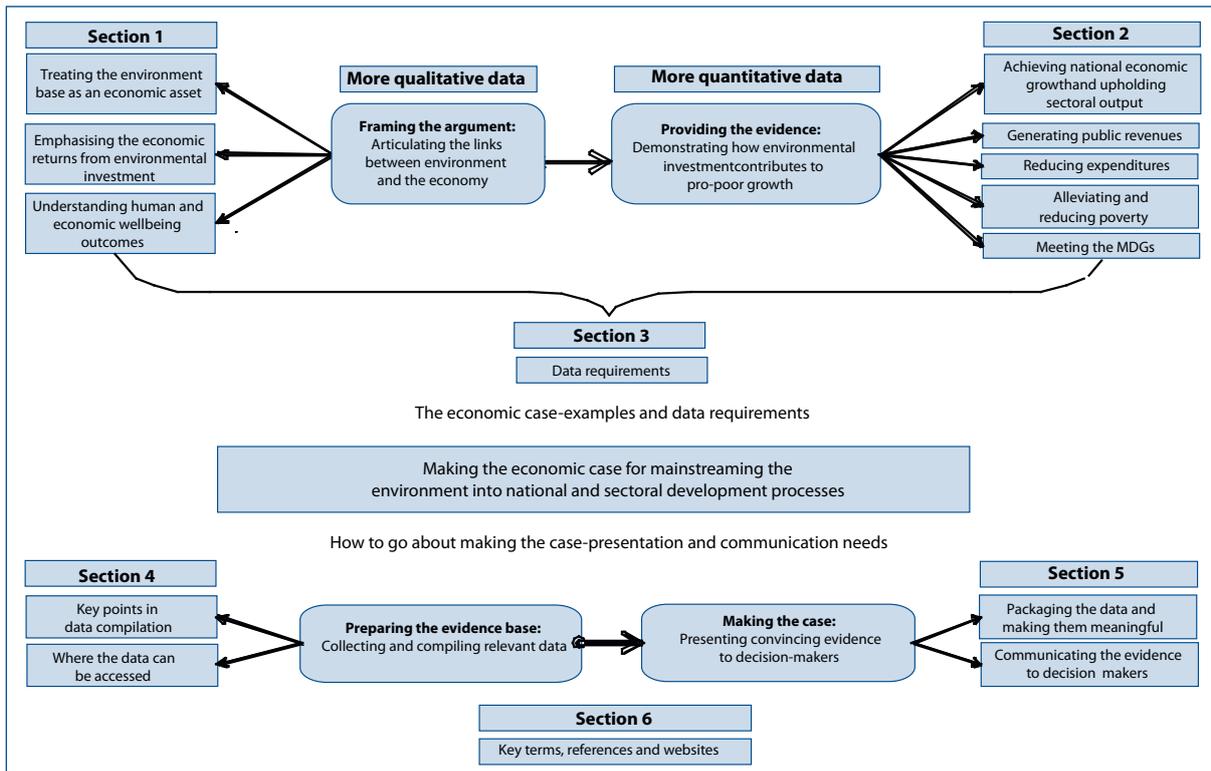
### How the primer is laid out

The primer provides a resource to help PEI country staff and counterparts to make the case for mainstreaming the environment into national and sectoral development processes, make sure they have the evidence to back this up, and identify a series of entry points to engage the attention of economic and development decision-makers and to enter into meaningful dialogue with them.

It aims to equip the reader with the means to:

- identify and collect appropriate data about the links between the environment and pro-poor growth,
- present this in a usable and policy-relevant form,
- communicate it effectively during interactions with macroeconomic and sectoral decision-makers such as those in finance ministries, treasuries, sectoral line agencies and local authorities.

Figure 1: Content of the primer



The first part of the primer explains why an economic case exists for environmental mainstreaming:

- Section 1 covers the background thinking that is first of all necessary to frame the argument, focusing on presenting more qualitative economic information,
- Section 2 describes the kinds of evidence that can subsequently be provided to back these arguments up, focusing on presenting more quantitative data requirements for putting together the case for environmental investment.

Each of the key messages and major points in these two sections are illustrated with real-world case studies and examples.

- Section 3 summarises the data requirements for making the economic case for environmental investment, according to the different steps and sections specified in the first two sections of the primer,

The second part of the primer then provides guidance on how to go about making the case for environmental mainstreaming, in the course of interactions with economic and development decision-makers in a given country or sector:

- Section 4 summarises the steps and data needs in preparing the evidence base, and indicates where data might be accessed,
- Section 5 outlines the kinds of strategies that can be used to package and communicate evidence in a form that is credible and convincing to economic decision-makers.

The final part of the primer, Section 6, provides a glossary of economic terms and list of key references on the links between the environment and pro-poor economic growth.

This primer draws upon cooperation with and input from the OECD DAC/EPOC Task Team on Governance and Capacity Development for Natural Resources and Environmental Management and is complementary to their upcoming report which provides an overview of and guidance for different approaches for making the economic case entitled “Making the economic case – a review of approaches for improving the economic analysis of environment and natural resources in national development planning” for improved management of environment and natural resources in national development planning.<sup>4</sup> This report is targeted at officials within ministries of planning/finance and environment as well as OECD members. This document will be available at [www.oecdbookshop.org](http://www.oecdbookshop.org).

# Framing the argument: articulating the links between environment and the economy

## Summary

Before presenting evidence on the actual links between the environment and pro-poor growth it is necessary to ensure that the decision-maker you are talking to is clear about the linkages between environment and the economy.

This in turn requires that you, as the person making the case for environmental investment, are well-briefed on how to understand and express the environment in economic terms— as a productive sector which can be managed to generate pro-poor economic growth. This background thinking enables you to frame the specific arguments and evidence which will later be presented to decision-makers about the need to mainstream the environment into economic development processes.

This section of the primer goes through this background thinking:

- Treating the environment base as an economic asset: environmental resources should be seen as productive natural capital, where there are trade-offs between investing in sustaining this natural capital and converting it to other uses.
- Emphasising the economic returns from environmental investment: the sustainable management of environmental assets generates a flow of economically valuable goods and services.
- Understanding human and economic wellbeing outcomes: environmental goods and services make a key contribution to the indicators that are used to measure progress towards economic growth, development and poverty reduction.

In summary, we are posing the environment base as an asset— a stock of natural capital, which yields a flow of economically valuable goods and services— the return on environmental investment, which in turn contribute towards positive economic and human wellbeing outcomes— the measures and indicators which are used to judge progress towards economic growth and poverty reduction. These linkages are illustrated in Figure 2.

Figure 2: Environmental economic assets, flows and outcomes



## Treating the environment base as an economic asset

A very first point to make is that the environment should be considered on an equal footing with other stocks of productive capital and sources of wealth in the economy— in statistical, policy and budgetary terms.

There is a need to communicate clearly to decision-makers that the environment asset base is a valuable stock of natural capital. When combined with other types of capital (such as financial, human, produced, institutional, and so on), it generates important benefits for human economies. The environment asset base is comprised of productive natural ecosystems and resources which generate economically important goods (such as timber, fisheries, minerals, non-timber forest products, water, firewood, fodder, medicines, etc.) and services (such as maintenance of water flow and quality, climate regulation, support to agricultural and fisheries productivity, protection against disease and disasters, etc.).

- The concept of natural capital is an extension of the notion of economic capital (i.e. manufactured means of production) to environmental goods and services. It refers to a stock of natural resources (for example soil, forests) which produce a flow of goods (for example crops, trees) as well as services (for example carbon sink and rainfall). In addition to the livelihoods and income provided by natural resources, natural capital can also be measured in end-products, such as a healthy and well-fed labour force. The concept of natural capital should be included in the definition of economic production since the effort or resources required to maintain natural capital contributes directly to a country's Gross Domestic Product.
- Natural capital or environmental assets are of particular importance to non-industrialised economies. A recent study by the World Bank<sup>5</sup> for example estimates that natural capital accounts for 26 percent of total wealth in low income countries, as compared to 13 percent in middle-income countries and just 2 percent of the wealth of industrialised nations.

Table 1 shows the estimated per capita value of natural capital and its contribution to total wealth in selected middle and low income countries, as estimated by the World Bank<sup>6</sup>. Although based on a limited range of environmental assets (subsoil assets, timber, non-timber forest resources, cropland, pastureland and protected areas), these figures provide a useful record of the economic importance of natural capital to countries' wealth.

**Table 1: Value and contribution of natural capital in selected middle and low income countries<sup>7</sup>**

Upper Middle Income	US\$/capita	percent total	Lower Middle Income	US\$/capita	percent total	Low Income	US\$/capita	percent total
Argentina	10,312	7 percent	Albania	3,892	22 percent	Bangladesh	961	16 percent
Belize	6,950	13 percent	Algeria	13,200	71 percent	Benin	1,333	17 percent
Botswana	3,183	8 percent	Bhutan	4,945	64 percent	Burkina Faso	1,219	24 percent
Brazil	6,752	8 percent	Bolivia	4,783	26 percent	Burundi	1,210	42 percent
Bulgaria	3,448	14 percent	Cameroon	4,733	44 percent	Chile	10,944	14 percent
Costa Rica	8,527	14 percent	Cape Verde	711	2 percent	Comoros	967	12 percent
Dominica	5,973	10 percent	Colombia	6,547	15 percent	Congo, Rep	9,330	265 percent
Fiji	2,208	5 percent	Dominican Rep	3,176	10 percent	Cote d'Ivoire	3,121	22 percent
Gabon	28,586	66 percent	Ecuador	13,117	39 percent	Ethiopia	796	41 percent
Grenada	640	1 percent	Egypt, Arab Rep	3,249	15 percent	Gambia	514	8 percent
Jamaica	2,627	5 percent	El Salvador	912	3 percent	Ghana	1,336	13 percent
Latvia	5,485	12 percent	Georgia	1,799	14 percent	Guinea Bissau	1,858	47 percent
Malaysia	9,103	19 percent	Guyana	10,301	65 percent	Haiti	793	10 percent
Mauritius	642	1 percent	Honduras	3,005	26 percent	Kenya	1,368	21 percent
Mexico	8,493	14 percent	India	1,928	28 percent	Madagascar	1,681	33 percent
Panama	5,051	9 percent	Indonesia	3,472	25 percent	Malawi	785	15 percent
Russian Fed	17,217	44 percent	Iran, Islamic Rep	14,105	59 percent	Mali	2,157	41 percent

It would be extremely naïve to deny that an inherent tension exists between economic development and sustainable environmental management. This tension is fundamentally to do with making choices about how, where and why to produce, consume and invest.

- A central issue in making the economic case for environmental investment is that there exist trade-offs between managing the environment asset base sustainably, and irreversibly converting it to other uses or forms of capital.
- As the following paragraphs describe, a recurring concern among decision-makers is to manage competing demands on natural resources and the environment, and to be able to ensure that the relative returns to these different choices are fully considered.
- Economic measures and indicators have a strong influence on how these trade-offs are conceptualised and decisions are made, and are an important factor when choices are made about how to use and allocate funds, resources and lands.
- In this primer, we are particularly concerned with ensuring that the returns to environmental investment are factored into decision-making.

### Emphasising the economic returns from environmental investment

Natural capital generates a flow of benefits. Just as the environment base should be seen as an economic asset, so there are tangible economic returns from investing in it. Conversely, running down this stock of natural capital imposes costs and losses on most sectors of the economy, and undermines pro-poor economic growth. If managed sustainably, the environment base will continue to yield economically productive and beneficial flows of goods and services. If used and managed unsustainably, these economic benefits will progressively be lost.

The return from environmental investment is the flow of economically important goods and services that the environment yields. These extend beyond the commercial raw materials and physical products that have conventionally dominated official statistics on the environment sector. Many decision-makers would see the value of a forest, for example, as comprising only its large-scale timber potential; the value of wetlands as being solely to do with commercial fisheries production; or the value of grasslands as limited to livestock production possibilities. In many cases, considerations of sustainability would also not be factored into decisions— for example the revenues from gross extraction or clearfelling, not the economic value of ecosystem services and sustainable harvesting.

Environmental investment also yields a wide range of other economic benefits, including flows of products which are used at the subsistence or small-scale level (such as firewood or wild foods) as well as services which underpin other productive activities and provide vital life support (such as the human health benefits of clean water and air, protection against disasters, maintenance of waterflow, or protection against the impacts of climate change and climate variability). The value of these goods and services however remains largely hidden in most official development statistics.

There are three main reasons why it is important to explain and emphasise the full range of both “visible” and “hidden” benefits as the economic return on environmental investment:

- First, this presents a more complete picture of the economic importance of the environment, and of the high and wide-ranging costs associated with environmental degradation and loss. It is important that decision-makers are aware of and appreciate the full— and diverse— range of values associated with environmental investment.
- Second, the focus on only commercial values has in many countries led to a situation where development and economic policy have placed undue emphasis on maximising the quantity of products extracted from the environment, even when these uses are not sustainable and may not even be optimal in economic terms. It is important that decision-makers understand that extractive commercial uses are only one option among many when seeking to maximise the economic returns from environmental investment— and often benefit the richer groups in society who are able to access and gain from these commercial benefits. If environmental assets are not managed for the long term, and are exploited only for short-term gain, they may never allow for economic development on the scale or of the type required to reduce poverty or to benefit the poor.

- Third, “hidden” environmental goods and services are especially important for the poorest and most vulnerable sectors of the population. In many cases, alternative sources of essential goods and services are simply not accessible or affordable elsewhere for them<sup>8</sup>, and they suffer disproportionately in health, economic and general wellbeing terms from environmental degradation and loss. It is important to underline to decision-makers that there is a very direct link between the return on environmental investment, and the welfare and survival of the poorest.

As the example in Box 1 illustrates for the case of Mexico, environmental under-valuation can lead to natural resource management decisions which not only compromise the supply of important economic benefits, but also prejudice against the stakeholders who depend on them.

### Box 1: The total economic value of forests in Mexico<sup>9</sup>

*Failure to account for the numerous functions and economic uses of forests have led to patterns of global forest use with many detrimental environmental consequences. For example, despite the large extent of commercially valuable forest resources in Mexico, the sector’s stated contribution to GDP has only ranged between 1.8 percent and 2 percent in the last decade. These official statistics, based primarily on commercial timber production, exclude many of the economic benefits associated with forests.*

*Calculating the total economic value of forests for non-marketed, non-extractive uses and benefits shows an annual lower bound value to be in the order of \$4 billion a year. This aggregate value includes future potential uses of the genetic resources and pure existence values; the largest proportion of economic value comes from hydrological and carbon cycling. This example demonstrates that a strong case can be made for forest conservation in the Mexican case, based on local, regional and global values of forests, and that these values should be incorporated into decisions on the future management of this important resource.*

*There would be considerable returns from capturing a greater range and level of benefits than is currently the case. Approximately one quarter of Mexico’s population live in forest areas, often subsisting in extreme poverty: several states with more than 50 percent forest cover have 40 percent of their population below the poverty line. Enhancing the value of non-timber forest products and increasing the capture of their value could, for example, bring significant benefits to poorer sections of rural communities, both in terms of providing subsistence goods, such as building materials, where substitutes might be expensive and produced outside the area, and in terms of direct income generation.*

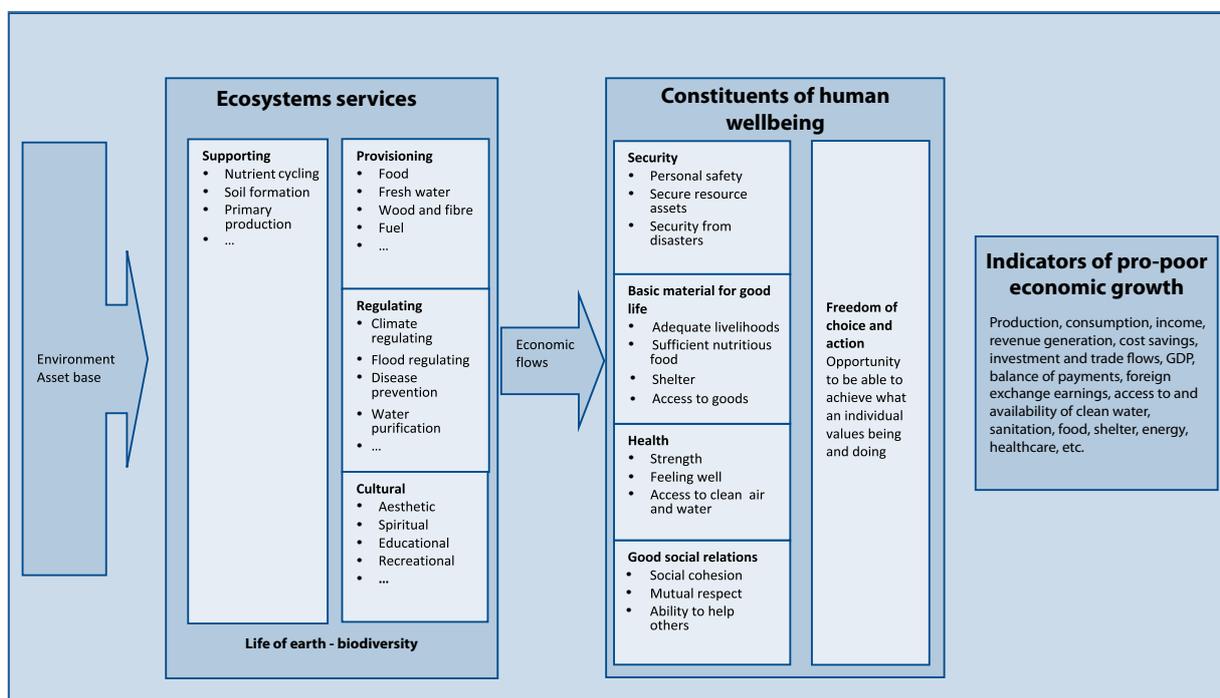
Forest goods & services	Value (US\$ million per year)
Tourism	32.1
Carbon sequestration	3,788.3
Watershed protection	2.3
Option value	331.7
Existence value	60.2
Total	4,214.6

## Understanding human and economic wellbeing outcomes

The third, and ultimate, point to make when framing your argument about the links between environment and the economy is that the returns from environmental investment yield positive outcomes for human and economic wellbeing— which are manifested as gains throughout the economy. The bottom line for decision-makers is to understand how changes in the environment base, and the flows of goods and services it yields, impact on pro-poor economic growth.

The now widely-known Millennium Ecosystem Assessment provides a particularly useful framework for tracing through the linkages between environmental assets and flows, the constituents of human wellbeing, and the indicators which are used to measure progress towards macroeconomic and sectoral policy goals concerned with economic growth, development and poverty reduction (Figure 3).

Figure 3: Linking environmental investment to human wellbeing and pro-poor economic growth



While the broader human and economic wellbeing outcomes of investing in key assets such as forests, crop land and fisheries for food, income, water and trade are relatively well-recognised, as are for example the human health benefits of clean water and air, it is important emphasising to decision-makers that environmental investment maintains many less obvious— but often equally if not more valuable— services, which also have important multiplier effects across the economy. Box 2 for example illustrates the ways in which insect populations provide economically important regulating services which in turn impact on global and local trade, food production and prices, and farmer income. It is these pro-poor economic growth outcomes and indicators which provide the primary evidence base for convincing decision-makers of the gains to them of investing in the environment – and which are detailed in the next section of this document.

**Box 2: The costs to human and economic wellbeing of insect decline<sup>10</sup>**

*There has been increasing concern – among ecologists and entomologists at least – about the disappearance of certain insects from areas where they were once widespread. Such losses in biodiversity were not, until recently, treated as much of a disaster by economic planners and decision-makers. It is only after the serious economic consequences of these environmental changes became apparent that politicians and policy-makers moved to mobilise funding to tackle the problems associated with insect decline.*

*A year ago, for example, disease wiped out 2.5 million beehives across the United States and fears were raised about similar outbreaks in Europe. About three quarters of flowering plants rely on birds, bees and other pollinators to help them reproduce. Bee pollination is thought to be responsible for about \$15 billion annually in crop value in the United States. Already the yield of certain commercially valuable crops (such as apples, almonds, cherries, blueberries, cucumbers, pumpkins, cranberries and alfalfa) have fallen, the costs to farmers of pollination fees have almost doubled over the last year, and food prices have started to go up.*

*On a global scale, many fruits, vegetables and stimulant crops are highly or totally dependent on insects for pollination. A recent study measured the economic impact of pollinators on agricultural output, considering 100 crops used directly for human food. The study found that the total economic value of pollination worldwide amounted to €153 billion, representing 9.4 percent of the value of world agricultural production used for human food. Vegetables and fruits were the leading crop categories in value of insect pollination with €50.9 and €50.6 billion, respectively, followed by edible oil crops, stimulants, nuts and spices.*

## Climate change and economic impacts

Climate change will have dramatic impacts in terms of agricultural productivity and food security, depletion of natural resource stocks including water, frequency of diseases leading to reduced productivity and increased health costs, reduced efficiency and cost effectiveness of existing and planned infrastructure and the macro-economic effects of more frequent climate related disasters. So far much of the focus has been on the science of climate change and the physical impacts that will arise. Traditionally climate policy has been led by Ministries of Environment with meteorology agencies. However with the growing awareness of the magnitude of the issue, there is a need for Ministries of Finance and Ministries of Planning to also gain a better understanding of the issues and how climate change adaptation can be addressed in national and sub-national planning processes and through fiscal (i.e. budgetary) and investment decision-making. A number of countries have started or are interested in economic analysis of climate change, and there is a need to review the aims, methodologies and results of such analysis. In terms of mitigating climate change, a number of countries are taking advantage of the competitive opportunities of new markets for low carbon products and services, such as renewable and energy efficient technologies. Leadership of the low carbon revolution depends on a dynamic private sector, but also the enabling institutions and policies provided by government including Finance and Planning Ministries. A further dimension of the global interest in climate change is the growing flow of external public and private funds for climate change. For mitigation, these funds tend to be private sector led through carbon trading, while for adaptation there is a growing availability of donor financing. These new sources of private and public financing outside traditional budget and fiscal systems will pose new challenges and opportunities for Ministries of Finance and Planning. There is a need to develop coherent systems to ensure sound public financial management while not undermining the desired objectives of these finances.<sup>11/12</sup>

# Demonstrating how environmental investment contributes to pro-poor economic growth

## Summary

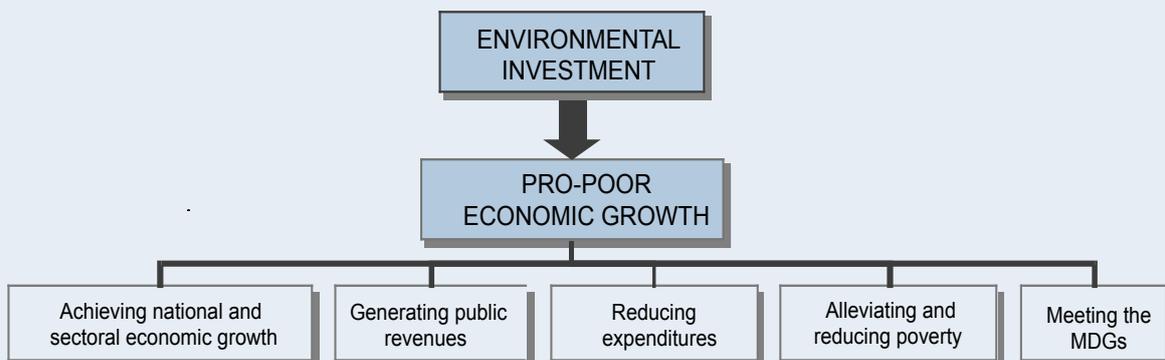
Having framed the argument, the next step is to provide concrete evidence about the contribution of environmental investment to pro-poor economic growth, employing the language and indicators which decision-makers themselves use to prioritise policies and investments, and track progress towards economic and development goals.

This section of the primer describes the outcomes of environmental investment in relation to five aspects of pro-poor economic growth which are likely to have the greatest resonance with decision-makers in Finance Ministries, Treasuries, Sectoral Line Agencies and Local Authorities:

- achieving national economic growth and upholding sectoral output.
- generating public revenues.
- reducing expenditures.
- alleviating and reducing poverty.
- meeting the Millennium Development Goals.

In summary, we are presenting data, figures and economic arguments which provide concrete, practical and policy-relevant evidence that will help to convince decision-makers of the gains to them of investing in the environment in terms of pro-poor economic growth outcomes. These arguments are illustrated in Figure 4.

Figure 4: Linkages between environmental investment and pro-poor economic growth



## Achieving national economic growth and upholding sectoral output

Progress towards a stable, dynamic and well-functioning economy remains at the core of most macroeconomic policy goals. Various indicators are used to measure the performance and growth of the national economy and of its component sectors, including year-on-year changes in GDP, employment rates, trade balances, foreign exchange earnings, investment and the public budget. Environmental goods and services typically make a substantial contribution to these indicators, and can continue to contribute to national economic growth if managed and used sustainably, for example:

- The fisheries sector for example contributes more than 10 percent of Gross Domestic Product in Cambodia, the Maldives and Kiribati, and more than 5 percent in Gambia, Mauritania and Sao Tomé.<sup>13</sup>
- Fish is the most valuable agricultural commodity that is traded internationally, with net export revenues earned by developing countries reaching US\$ 17.7 billion in 2001— more than coffee, cocoa, sugar and tea combined.<sup>14</sup>
- Forestry provides more than 10 percent of the Gross Domestic Product in many of the poorest countries. In all developing countries taken together, the forestry sector provides formal employment for 10 million people and informal employment for another 30 to 50 million people.<sup>15</sup>
- In Cameroon, the Central African Republic and Liberia, forests contribute from nearly 30 percent to more than 40 percent to national exports.<sup>16</sup>
- In the Maldives, marine and coastal tourism directly accounts for 20 percent of Gross Domestic Product and its wider effects help produce 74 percent of national income; it contributes more than 60 percent of foreign exchange receipts, over 90 percent of government tax revenue comes from import duties and tourism-related taxes, and almost 40 percent of the workforce is employed in the industry.<sup>17</sup>
- In the Seychelles, environmental goods and services contribute up to a quarter of all employment opportunities, one third of government revenues and two thirds of foreign exchange earnings.<sup>18</sup>

Figures such as these can all provide compelling evidence to decision-makers of the importance of the environment to national economic growth and sectoral output.

However, with few exceptions, the official figures used by governments and donors to track national income and economic performance massively underestimate the contribution of the environment. Even records of commercial, formal sector activities such as those mentioned in the paragraph above tend to be incomplete and to exclude a substantial proportion of economic activity, income and employment. For example:

- Official data show that forests contribute 1 percent to 2 percent of Gross Domestic Product in Indonesia, whereas the World Bank estimates that the potential value of forests to that economy is closer to 15 percent to 20 percent of Gross Domestic Product.<sup>19</sup> Environmental resources typically play a far more important economic role than official statistics suggest.

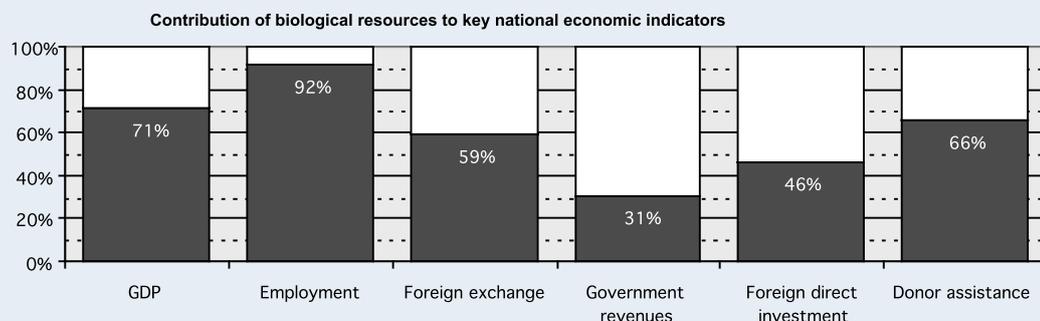
Box 3 describes an exercise carried out in Lao PDR to quantify the full contribution of biodiversity to the national economy and key development goals.

**Box 3: The value of biodiversity to Lao PDR's economy<sup>20</sup>**

*With the major aims of ensuring that environmental policy was informed by economic thinking, and could be justified to economic planners and decision-makers, an economic assessment was carried out as part of Lao PDR's National Biodiversity Strategy and Action Plan. The results underlined the importance of biodiversity to the country's key development goals as articulated in the Five Year Socio-Economic Development Plan and National Development Vision.*

*The bulk of the value of biodiversity is however comprised of non-marketed services and household-level benefits that never appear in formal markets and therefore remain largely invisible to economic decision-makers and planners.*

*Correcting for these omissions, the economic assessment showed that biodiversity contributes, directly or indirectly, almost three quarters of per capita Gross Domestic Product, more than 90 percent of employment, just under 60 percent of exports and foreign exchange earnings, a third of government revenues, nearly half of foreign direct investment and two thirds of donor assistance.*



For these reasons it is important to ensure that decision-makers are made aware not just of the importance of recorded environmental output and income to the national economy and to keys sectors, but are also presented with information about these broader values and their multiplier effects across the economy as well as with a comprehensive understanding of the importance of sustainability in the management of environmental and natural resources.

Subsistence-level benefits are one category of economic values which are often excluded from estimates of sectoral output and income, even though they tend to be particularly important in terms of pro-poor growth. Taking the example of the forest sector, non-timber forest products often generate considerable economic output at the local level— although they are rarely incorporated into formal estimates of output. For example:

- In Lao PDR, the value-added to livelihoods from non-timber forest product collection in 2000 was calculated to be more than \$185 million— as compared to gross revenues from commercial round log harvesting of around \$50 million.<sup>21</sup>
- Similarly, subsistence-level forest use in 2001 was worth more than twenty times as much as formal sector commercial forestry earnings in Kenya.<sup>22</sup>
- Across many parts of the developing world, woodfuel comprises both the primary source of household energy, although these figures are rarely included fully in energy sector estimates. For example In Malawi some 90 percent of national energy requirements are met from trees, in Mozambique 80 percent, in Tanzania 97 percent, and in Zambia 70 percent.<sup>23</sup>

A second category of economic benefits which usually remains hidden in national and sectoral statistics is the contribution made by the environmental services provided by specific ecosystems (for example waterflow and quality, biological productivity, soil condition and land productivity, landscape qualities). These services are often critical to sectoral output and income. For example:

- On the Baluchistan coast of Pakistan, it is estimated that mangroves are responsible for providing the nursery and breeding habitat upon which up to a half of off-shore commercial fish yields depend.<sup>24</sup>

- Healthy coral reefs in Southeast Asia have been found to increase fish productivity by more than 10 tonnes per square kilometre per year.<sup>25</sup>
- The present value of sustainable upland forest management to Ecuador's Paute hydroelectric scheme, as reflected in increased power revenues, lower dredging costs and an extension to the dam's lifespan, were calculated to range between \$15 million and \$40 million— making the point that upper watershed management is in the direct economic interests of the power sector.<sup>26</sup>

Box 4 illustrates these points, showing how the inclusion of environmental service values substantially increases estimates of the value of environment to Uganda's forestry, livestock and fisheries sectors.

#### **Box 4: Sectoral contributions of environmental resources to the forest, livestock and wetlands sectors in Uganda<sup>27</sup>**

*Agriculture, forestry and fisheries contribute around a third of Uganda's Gross Domestic Product, worth an estimated \$2 billion according to official statistics. While natural resources obviously make a high contribution to the output of these sectors— via timber and other wood products, livestock production and fisheries, for example— the actual contribution of the environment is far higher than this.*

*Taking into account selected other environmental services generated within these sectors shows that the economic benefits of soil and water conservation and water purification services, as well as inputs to livestock production are also large, although largely unrecorded. Including these additional sources of sectoral output increases gross income figures by more than a quarter in the forestry and wetland sectors, and shows that environmental resources contribute a half of recorded livestock income.*

Sectors and values	Gross income (US\$ mill/year)
<b>Forestry</b>	
Timber, polewood and woodfuel production	132.97
Soil & water conservation services	113.62
<b>Livestock</b>	
Livestock production	281.08
Inputs from natural grasslands, bushlands and wetlands	139.34
<b>Fisheries and wetlands</b>	
Fisheries production	313.13
Water purification services	4.08

## **Generating public revenues**

Maintaining healthy public budgets is a major concern for most economic and development decision-makers, as they are usually under heavy pressure to generate revenues. The processes of decentralisation and devolution of financial management which are ongoing in many countries mean that government agencies are increasingly being made responsible for generating their own revenues and funding their own expenditures.

Showing the economic importance of sustainable environmental management in terms of public financial management underlines its importance to the government as a key earning sector— both for ministries of environment as well as for central treasuries and other line agencies. Environmental resources often provide significant earnings for governments. For example:

- Between 1993 and 1999, fishery access agreements with foreign fleets provided 30 percent of government revenues in Guinea Bissau, 15 percent in Mauritania, and 13 percent in Sao Tomé.<sup>28</sup>

- In Botswana more than half of fiscal revenues are derived from mining, copper contributes 22 percent of fiscal earnings in Chile, and gold, copper, zinc and other minerals account for 43 percent of government revenues in Peru.<sup>29</sup>

Box 5 describes the importance of the environment to government revenues in the Seychelles.

**Box 5: The contribution of biodiversity to government revenues in the Seychelles<sup>30</sup>**

*Although the environment and natural resources are typically lucrative sources of government revenues, decision-makers often remain unaware of their full significance to public budgets or of the importance of the environment to the earnings of other sectors and line agencies. Work carried out in the Seychelles identified the full range of income which accrued to the government from the country's biodiversity, including both direct taxes and levies on resource extraction and sales as well as the contribution of the environment to the earnings of other sectors such as through hotel levies, airport taxes and port expenditures. In total, biodiversity contributes around a third of government revenues in the Seychelles.*

Sources of revenues	Annual receipts (R '000)
Bednight levies on nature tourist hotels	11,500
Airport taxes on nature tourists	9,700
Protected Area revenues	1,263
Giant tortoise export revenues	90
Fish licences	36,200
Forest produce sales	973
Tree felling permit revenues	32
Port expenditures from nature tourism and natural resource exports	153,834
Total	213,592
percent of all public revenues	33 percent

Such lines of reasoning can also be used to point to cases where public income can be increased through improved environmental investment. This is a key aspect of making the economic case: in many instances decision-makers may appreciate the total value of sustainable environmental management, including unmarketed or less tangible benefits, but still be in a situation where they need to ensure that material gains and income streams can be demonstrated. However high the economic significance of environmental investments is in theory, there remains a need to point out ways in which revenues and income can be generated from these values in a tangible— and sustainable— form.

Improved revenue generation, and the capture of environmental benefits, can be achieved by rationalising and improving existing environmental charges, fees and taxes or by introducing new payment systems for environmental goods and services. Environmental fiscal reforms and payments for environmental services are for example both becoming more and more widespread as a mechanism for assisting governments to raise revenues, while simultaneously furthering poverty reduction and environmental goals. Carbon finance is another emerging market which governments and other organisations are using to raise revenues for the environment. For example:

- A quarter of Cameroon's taxes come from timber, and half of Bhutan's revenues are generated by hydropower.
- In Honduras residential consumer water bills have been increased by 35 percent and the additional revenues used for the conservation of the El Escondido watershed.<sup>31</sup>
- Similarly, a user charge (an amount equivalent to 3 percent of revenues from hydropower and electricity companies) has been introduced in Colombia for forest watershed services as a means to provide resources for watershed conservation.
- According to figures from the World Bank, the value of carbon transactions doubled between 2006 and 2007, to reach \$64 billion— and it is forecast to exceed \$100 billion by the end of 2008. Last year traders bought and sold about \$60 billion worth of emissions allowances, mostly in Europe and Japan, where governments regulate greenhouse gases. If, as expected, regulation comes to the USA, this country's carbon-trading market is expected to be worth \$1 trillion annually by 2020.

Box 6 provides an example of the way in which payments for forest hydrological services have been used as a mechanism for public income generation in Ecuador, and Box 7 describes a new initiative to raise money from carbon offsets in order to fund forest conservation in Aceh, Indonesia.

**Box 6: Payment for watershed services to generate public revenues for environmental management in Ecuador<sup>32</sup>**

*The establishment of markets for environmental services is becoming increasingly widespread as a means of generating funding for environmental activities, these schemes institute cash or in-kind payments from the beneficiaries or users of such services to the government institutions, private landholders and communities who manage ecosystems which generate important off-site services. Although in principle payment for environmental services are applicable to a wide range of situations, in practice there is most experience with their use in relation to forest hydrological services and carbon sequestration.*

*The case of Cuenca in the southern Ecuadorian Andes provides an example where payment for environmental services have been used as a mechanism to raise public revenues for environmental management. Around 60 percent of the city's water supply comes from nearby Cajas National Park, which lies under the overall jurisdiction of the Municipal Company of Telecommunications, Potable Water, Sewage and Wastewater Treatment (ETAPA) and is managed by a local government agency, the Municipal Corporation of Cajas National Park.*

*An important part of funding for the Municipal Corporation comes through surcharges levied on water bills and other payment systems for water users in Cuenca (such as a hydropower facility), channelled through ETAPA. In addition to covering the administrative and running costs of the Corporation, money has been used to purchase additional lands in the watershed to be set aside for protection, to finance watershed management projects, and to provide revolving credit and technical advice to farmers in the mid-watershed to help them increase their water use efficiency. In 2003, the Corporation's budget was around \$700,000, of which approximately \$200,000 came from water fees and from tourism entrance fees for the National Park.*

**Box 7: Carbon finance as a mechanism for raising funding for forest conservation in Aceh, Indonesia**

*One of the most recent efforts to generate environmental finance through the sale of carbon offsets is an initiative launched in 2008 which aims to prevent the logging and conversion of 1.9 million ha of forest in Ulu Masen, Aceh, Indonesia. This effort is expected to reduce carbon dioxide emissions by 100 million tons over 30 years. Under a deal brokered by local government, with the support of several international NGOs, the emerging interest in carbon finance for reducing emissions from deforestation in developing countries (REDD) is being tapped to raise funds for conservation.*

*The sale of carbon credits will be used to help fund health and education projects in the local community. The project organizers estimate they will be able to reduce deforestation on 750,000 hectares of land by 85 percent over 30 years and thereby avoid the emission of more than 3.3 million tons of carbon dioxide annually.*

*Carbon credits will be sold to multiple buyers. For example Merrill Lynch, an international financial management and advisory company, is paying \$4 per credit for 500,000 credits per year over the next four years, hoping to sell them for a profit to companies that want to voluntarily offset their carbon emissions. Currently, these voluntary credits— each one represents a ton of CO<sub>2</sub> that is prevented from entering the atmosphere— sell from between \$2 and \$20 each.*

## Reducing expenditures

The continued provision of environmental goods and services saves costs for the government, the private sector, and at the household level. Natural resources provide a cheap and accessible source of income and basic needs (thus reducing the need to make cash expenditures on purchased alternatives),

and also reduce the likelihood of broader economic losses and damages (for example health costs, loss of income, reduced production and public expenditures on mitigating the effects of disasters).

Sustainable environmental management and natural resource extraction ensure that long-term economic costs and losses are avoided. In most cases the costs of environmental degradation are immense when calculated at the national level, and the long-term losses of unsustainable land use and resource exploitation are huge.

Maintaining natural ecosystems for the provision of important goods and services is also often a more cost-effective option than providing these goods and services through artificial technologies. Conserving an upstream forest, for instance, typically costs far less than investing in new water filtration and treatment plants downstream, or undertaking expensive de-siltation activities. For example:

- In Portland, Oregon, Portland, Maine and Seattle, Washington it has been found that every \$1 invested in watershed protection can save anywhere from \$7.50 to nearly \$200 in costs for new water treatment and filtration facilities.<sup>33</sup>
- Through conserving upstream forests in the Catskills range, New York City hopes to have avoided investing an extra \$ 4-6 billion on infrastructure to maintain the quality of urban water supplies.<sup>34</sup>

Box 8 illustrates how the losses associated with environmental degradation are spread throughout many different sectors and social groups in Pakistan’s national economy, and together amount to a significant figure in absolute terms and as a proportion of Gross Domestic Product.

**Box 8: The costs of environmental degradation to Pakistan’s economy<sup>35</sup>**

*Pakistan’s environmental problems are a concern, not just because of the intrinsic virtues of promoting responsible environmental stewardship, but also because of the economic consequences of environmental degradation.*

*A recent study found that the mean annual cost of environmental degradation is approximately \$6 billion, or six percent of GDP—a rate which is of a similar magnitude to the recent growth performance recorded in the National Accounts. The highest cost is from inadequate water supply, sanitation and hygiene (\$1.87 billion) followed by agricultural soil degradation (\$1.17 billion) and indoor air pollution (\$1.12 billion). Urban air pollution from particulate matter adds another \$1 billion. The estimated cost of lead exposure is about \$750 million. Rangeland degradation and deforestation cost are the lowest at about \$115 million in total.*

*The study identifies a wide range of costs that are associated with environmental degradation. Health damages arising from pollution and poor water supplies incur both private and public medical expenditures, as well as resulting in decreased production and income through work days lost. Soil erosion and salinity, compounded by consistent mismanagement of irrigation and poor land use management, have resulted in a reduction in cultivable area, decreased crop yields and lower fodder yields. Deforestation has led to local private forest losses, including from sustainable logging, non-timber products, tourism and recreation*

Sources of degradation	Costs (US\$ mill/yr)	percent of total
Water supply, sanitation and hygiene	1,874	31 percent
Soil salinity and erosion	1,171	19 percent
Indoor air pollution	1,121	18 percent
Urban air pollution	1,087	18 percent
Lead exposure	753	12 percent
Rangeland degradation	70	1 percent
Deforestation	45	1 percent

The role of the environment in reducing the risk and mitigating the effects (and costs) of natural and human-induced disasters (including those associated with climate change and climate variability) is one that is attracting increasing attention among decision-makers. The economic significance of these services are often immense, for example:

- Three wetlands in Malawi, Mozambique and Zambia, for example, play an appreciable role in minimising downstream flooding, leading to avoided private and public costs in terms of the relocation of people, replacement of damaged roads and rail infrastructure, loss of farm fields and livestock, and destroyed settlements; these costs avoided have a net present value of \$3 million.<sup>36</sup>
- Djibouti's pastoralist population relies on emergency foods from woodlands to the tune of some \$2 million in times of severe drought, which generate tangible savings in government and donor food relief expenditures.<sup>37</sup>
- Each hectare of mangrove forestland in India's Orissa State has been calculated to be worth more than \$8,000 in protecting coastlines and minimising cyclone damages through lowering the degree of house damage, reducing the incidence of livestock death, and minimising the destruction of other assets and property.<sup>38</sup>
- Healthy coral reefs in the Caribbean are estimated to provide shoreline protection services worth between \$2,000/km<sup>2</sup> (in virtually unpopulated areas) and \$1 million/km<sup>2</sup> (in densely settled and developed areas).<sup>39</sup>

### Alleviating and reducing poverty

Poverty reduction lies at the root of macroeconomic and sectoral development goals in most developing countries. Being able to provide evidence that environmental investment is a key strategy for alleviating and reducing poverty is therefore critical when making a case for mainstreaming the environment into national and sectoral development processes.

Because the poor tend to rely much more heavily on environmental goods and services than other sectors of the population, and as they are less able to deal with the effects of environmental degradation and loss, the maintenance of good environmental status is core to meeting their basic needs and alleviating poverty over the short and medium-term. Natural resource degradation and over-exploitation is often carried out to the primary benefit of richer groups and elites, leading to both on-site and off-site costs to the poor (for example their marginalisation and alienation from productive lands and resources, reduced water supplies and soil erosion)— which they are ill-equipped to bear. As relative poverty and vulnerability levels rise, so the relative contribution of environmental goods and services to household livelihoods and basic needs often increases. For example:

- Work carried out in rural Zimbabwe for example shows that environmental resources make a significant contribution to the income of most households; however for the poorest quintile their relative role is by far the greatest, around 40 percent of total income.<sup>40</sup>
- In an urban area of northern Bolivia, it was found that more than half of city-dwellers participated in one form or another in the Brazil nut or Palm heart industries; the poorest income group was most dependent on this source of livelihood, obtaining almost half of their income from it.<sup>41</sup>
- A study of villages in the Himalaya region found that the poor relied on natural resources for around 25 percent of their income, as compared to under 5 percent for the rich.<sup>42</sup>
- In the Chobe region of Botswana, the poor were found to depend on wild products from common property lands for half their income, as compared to less than a fifth for richer households.<sup>43</sup>

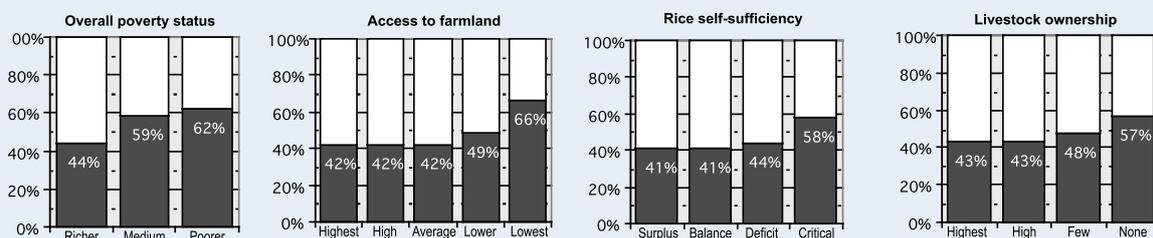
Box 9 shows how, in Lao PDR, the poorest households with access to few or no assets depend most on biological resource use for their day-to-day economic survival.

**Box 9: Household poverty and dependence on biological resources in Lao PDR<sup>44</sup>**

*Nam Et and Phou Loei (NEPL) National Protected Areas are located mainly in Houaphan Province of the Northern Region of Lao PDR. The Northern Region has the highest prevalence of poverty in the country; poverty is highest in Houaphan Province, where three quarters of the population were classified as poor in 1998. NEPL's resources provide a wide range of products that are used for income and subsistence by the 3,600 households who live in and around the protected area, who together comprise more than 24,000 people.*

*Unsurprisingly, the economic value of biological resource use is significant. On average it contributes approximately a quarter of household cash income and around a half of total production and consumption. This cash income alone is more than double the entire annual development budget of central government and donors working in the Province.*

*What is however striking is the clear correlation between rising levels of household poverty and increased reliance on the natural resource base. For the poorest, biological resources contribute almost half of cash earnings and more than 60 percent of overall consumption. According to the measures of relative wealth and poverty outlined in the 2001 Lao PDR Interim Poverty Reduction Strategy Paper (rice surplus/deficit, cropped area, and livestock numbers), both the richest and the poorest households consistently harvest forest products to a much higher annual value than other sectors of the population. Yet whereas richer households focus primarily on higher-value market commodities, the high forest values accruing to poorer households reflects their reliance on forest products for subsistence and home consumption, and the absence of alternative sources of income. Although valuable in absolute terms, forest resources do not form the main component of richer households' production. As poverty levels rise, so forest products make a progressively greater economic contribution to livelihoods.*



Women, too, are often disproportionately dependent on environmental goods and quality— because they are in many cultures responsible for the household provision of products which are partially or wholly sourced from the environment (such as food, water, domestic energy and medicines), and also because natural resources offer them an accessible source of income. For example:

- In a highland community in the Sierra de Manantlán Biosphere Reserve in Mexico, for example, it was found that collecting and selling of non-timber forest products was almost exclusively undertaken by women, with 80 percent of respondents participating; NTFP sales ranked as the most important source of cash income for 30 percent of women interviewed, and either second- or third-most important for the remainder.<sup>45</sup>

In terms of long-term poverty reduction, environmental resources provide a stock of wealth which can enhance economic resilience and offer opportunities for economic growth for the poor, as well as being converted into broader development benefits. If sustainably managed, natural capital or environmental assets provide a means of generating wealth and income which can both directly benefit the poor through strengthening and expanding their livelihood base as well as providing an important source of development finance that governments can reinvest in poverty-focused growth.<sup>46</sup> For example:

- Adding value to sustainable natural resource use for example provides many opportunities for targeting income-generation and wealth creation for poor households.
- Small and medium-scale enterprises owned and managed by primary producers and processors

of natural resources can make substantial contributions to reducing the incidence of poverty and assisting households to escape the poverty trap.<sup>47</sup>

Likewise, investments which reduce or reverse environmental damage have potentially huge benefits in poverty reduction terms. Box 10 illustrates for the case of Cameroon how economic arguments can be made for investment in environmental restoration as a mechanism for poverty reduction, and for treating the environment as a core part of poverty funding.

**Box 10: The returns to investing in environmental restoration for reducing poverty in Cameroon<sup>48</sup>**

*Covering an area of some 8,000 km<sup>2</sup> in northern Cameroon, the Waza Logone floodplain represents a critical area of biodiversity and high productivity in a dry area, where rainfall is uncertain, the incidence of poverty high, and livelihoods extremely insecure. The floodplain's natural goods and services provide basic income and subsistence for more than 85 percent of the region's rural population, or 125,000 people. The biodiversity and high productivity of the floodplain depend to a large extent on the annual inundation of the Logone River. However, in 1979 the construction of a large irrigated rice scheme reduced flooding by almost 1,000 km<sup>2</sup>. This loss of flooding has had devastating effects on the ecology, biodiversity and human populations of the Waza Logone region.*

*Undertaking engineering works to reinstate the flooding regime has the potential to restore up to 90 percent of the floodplain area, at a capital cost of approximately US\$11 million. In order to make the case to Government and donors for investment in reinundation as part of ongoing poverty alleviation and rural development funding, a study was carried out to value the environmental and socio-economic benefits of flood release and costs of flood loss to date.*

*This study found that the socio-economic effects of flood loss have been significant, incurring livelihood costs of almost \$50 million over the 20 or so years since the scheme was constructed. Local households have suffered direct economic losses of more than US\$2 million a year through reduction in dry season grazing, fishing, natural resource harvesting and surface water supplies. The affected population, mainly pastoralists, fisherfolk and dryland farmers, represent some of the poorest and most vulnerable groups in the region.*

*The economic value of floodplain restoration, and return on investment, will be significant in development and poverty allevation terms. Adding just under \$2.5 million a year to the regional economy, or US\$3,000 per km<sup>2</sup> of flooded area, the benefits of reinundation will have covered initial investment costs in less than 5 years. Investment in flood restoration measures show an economic net present value of \$7.76 million, and a benefit:cost ratio of 6.5:1. Ecological and hydrological restoration will also have significant impacts on local poverty alleviation, food security and economic well-being.*

Losses to local households		Measures of economic profitability	
Pasture	\$1.31 mill/year	Net present value	\$7.76 mill
Fisheries	\$0.47 mill/year	Benefit:cost ratio	6.5:1
Agriculture	\$0.32 mill/year	Payback period	5 years
Grass	\$0.29 mill/year	Costs and benefits of flood restoration	
Surface water supply	\$0.02 mill/year	Capital costs	\$11.26 mill
Total	\$2.40 mill/year	Net livelihood benefits	\$2.32 mill/year
Physical effects of flood restoration			
Additional flow	215 m <sup>3</sup> /sec		
Flood recovery	90 percent		

## Meeting the MDGs

The environment makes an important contribution to meeting the Millennium Development Goals. Environmental goods and services link not only to MDG 7, but also to the MDGs concerned with hunger, education, gender, child mortality, health, disease, water and sanitation. Conversely, environmental degradation poses a significant barrier to achieving MDG targets, and may ultimately undermine any progress that is made towards meeting them. Table 2 summarises the key links between the environment and the MDGs.

Table 2: Key links between the environment and the MDGs<sup>49</sup>

MDG1 Eradicate extreme poverty and hunger	Livelihood strategies and food security of the poor often depend directly on healthy ecosystems and the diversity of goods and ecological services they provide.
MDG2 Achieve universal primary education	Time spent collecting water and fuel-wood by children, especially girls, can reduce time at school.
MDG3 Promote gender equality and empower women	Poor women are especially exposed to indoor air pollution and the burden of collecting water and fuel-wood, and have unequal access to land and other natural resources.
MDG4 Reduce child mortality	Water-related diseases such as diarrhoea and cholera kill an estimated 3 million people a year in developing countries, the majority of which are children under the age of five.
MDG5 Improve maternal health	Indoor air pollution and carrying heavy loads of water and fuel-wood adversely affect women's health and can make women less fit for childbirth and at greater risk of complications during pregnancy.
MDG6 Combat major diseases	Up to one-fifth of the total burden of diseases in developing may be associated with environmental risk factors— and preventive environmental health measures are as important and at times more cost-effective than health treatments
MDG7 Ensure environmental sustainability	Current trends in environmental degradation must be reversed in order to sustain the health and productivity of the world's ecosystem

The human health benefits of clean water and air, and their economic importance, are of particular significance when making the economic case for investing in the environment. Air and water pollution both have a major impact on human health in both rural and urban areas. For example:

- The costs avoided of taking measures to control indoor air pollution in India have for example been estimated at between \$50-100 per disability-adjusted life year.<sup>50</sup> Urban air pollution from traffic and industrial sources remains one of the most significant and costly environmental problems facing cities.
- The annual health costs caused by particulate emissions from diesel-powered vehicles in Colombo in Sri Lanka are for example estimated at more than \$200 million in terms of the cost of investigations, drug treatment and personnel cost, doctor's time and non-medical costs such as costs incurred by the patient for food and accommodation.<sup>51</sup>
- Work carried out in Kanpur, one of India's most polluted cities, finds that the annual economic costs of unsafe levels of vehicular pollution are around \$50 million, suggesting significant economic savings and incentives for undertaking clean up initiatives.<sup>52</sup>
- In Lebanon, a wide range of costs to society arising from sub-standard quality and an inadequate quantity of potable water have been estimated.<sup>53</sup> More than 13,000 disability-adjusted life years are lost each year from waterborne disease and mortality at a damage cost of between \$27-53 million, the costs of medical treatment and care giving are estimated at \$52 million, and annual costs incurred to households through the purchase of bottled water and installation of additional water purification equipment are judged to be more than \$80 million and \$45 per resident respectively.

As the causes of air and water pollution are largely environmental in nature (for example from industrial and agricultural contamination, poor sewerage and sanitation facilities, or upstream deforestation, siltation and sedimentation), an important point to make concerns the economic importance of the environment in helping to minimise or avert such health risks and costs, and to provide essential air and water quality services.

Box 11 presents an example of the way in which natural wetlands in Uganda play an extremely important, and economically valuable, role in providing waste treatment and water quality services for urban populations.

#### **Box 11: Wetlands and water quality in Uganda<sup>54</sup>**

*Covering an area of some 5.5 km<sup>2</sup> and a catchment of over 40 km<sup>2</sup>, Nakivubo wetland runs from the central industrial district of Kampala, Uganda's capital city, passing through dense residential settlements before entering Lake Victoria at Murchison Bay.*

*Nakivubo plays an extremely important role in assuring urban water quality in the city. Both the outflow of the only sewage treatment plant in the city, and— far more importantly, because over 90 percent of Kampala's population have no access to a piped sewage supply— the main drainage channel for the city, enter the top end of the wetland. Nakivubo functions as a buffer through which most of the city's industrial and urban wastewater passes before discharging into nearby Lake Victoria. The wetland physically, chemically and biologically removes nutrients and pollution from these wastewaters. These services are important— the purified water flowing out of the wetland enters Lake Victoria only about three kilometres from the intake to Ggaba Water Works, which supplies all of the city's piped water.*

*In the face of pressures to drain and reclaim Nakivubo for housing and industry, a study was carried out by the government Wetlands Inspectorate Division to assess the economic importance of Nakivubo for waste treatment and water quality. This looked at the replacement costs of achieving equivalent wastewater treatment services from artificial technologies, as well as the costs of remediating for the loss of the wetland through upgrading purification facilities at the city water supply plant.*

*The study found that the wetland currently provides water quality services to urban dwellers to a value of more than \$2 million a year. On the basis of this economic argument, and through highlighting the role of Nakivubo as an essential part of Kampala's water and sanitation infrastructure, plans to drain and reclaim the wetland were reversed and Nakivubo was designated as part of the city's greenbelt zone.*

The economic significance of natural resource-based medicines and healthcare is in most cases substantial, both in terms of market values and savings on purchases of bought drugs, but also in relation to the benefits of health improvements and disease avoidance. For example:

- The national-level annual volume of medicinal plant harvest in Nepal was estimated to be around 15,000 tonnes in 1997-98 and to generate export values of more than \$15 million, while involving around 10 percent of rural households.<sup>55</sup>
- Earnings from traditional healing practices in Madagascar are thought to exceed \$10 million a year, and involve around 10,000 individuals.<sup>56</sup>

A similar situation holds for the case of wild foods, and their role in avoiding hunger and upholding household nutrition and food security— even though for many years their importance as a dietary supplement, source of nutrition and a means of survival have been largely overlooked.<sup>57</sup> For example:

- In Lao PDR, wild foods are consistently ranked as the most important forest resource by rural villagers, and have been calculated in one Province to contribute between 61-79 percent of non-rice food consumption by weight, and provide an average of 4 percent of energy intake, 40 percent of calcium, 25 percent of iron and 40 percent of vitamins A and C.<sup>58</sup>
- In the Democratic Republic of Congo, wild foods comprise around one third of household production. Wild meat, fish and plants contribute 3 percent, 6 percent and 10 percent respectively to the total value of the food consumed in the household, corresponding to 0.04

kg/day, 0.06 kg/day and 0.11 kg/ day respectively. They also make an important contribution to household income, thus indirectly increasing food security, generating twice as much for household sales as crops.<sup>59</sup>

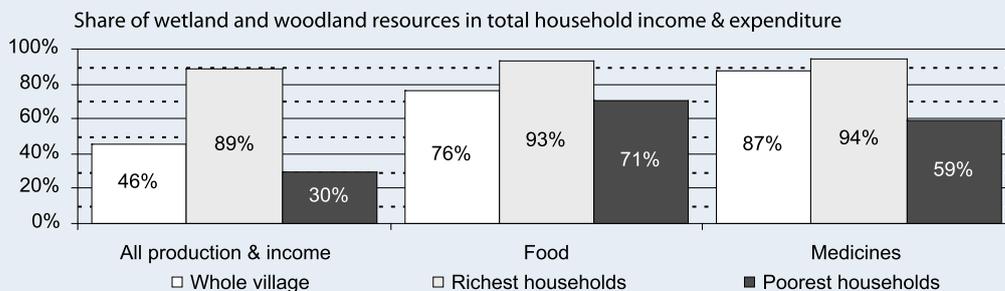
- In four countries in Central Africa– Cameroon, Central African Republic, Republic of the Congo, and the Democratic Republic of Congo– edible insects, especially caterpillars are a main source of protein for communities living around forests. In addition their trade provides additional income for rural people, especially women. There is evidence that the demand for caterpillars, in particular, is growing, including for exports, and that more people are becoming involved in their trade.<sup>60</sup>

Box 12 describes how woodland and wetland resources constitute a key source of food and medicines for poor households in rural Tanzania, and save considerable expenditures on purchased alternatives.

**Box 12: Wetlands, woodlands, health, nutrition and rural wellbeing in Tanzania<sup>61</sup>**

*In Mtanza-Msona Village in east-central Tanzania (where more than a third of the population live below the poverty line), wetland and woodland resources underpin the key components of human wellbeing. They provide for household energy, health, shelter, nutrition, tools and cash income generation. The local value of woodland and wetland resources is equivalent to just over \$107 per capita or 37 percent of GDP.*

*A comparison of the value of wetland resources with other sources of production, consumption and basic needs underlines their role and importance in the household and village economy– especially for the poor. Looking at three basic indicators: the total value of household production for home consumption and sale, food/nutrition, and healthcare/medicines shows that natural products make a staggering contribution to household welfare, and save considerable expenditures on purchased alternatives. They are worth almost eight times as much as all other sources of farm and off-farm production for the poorest households in the village. The value of plant-based medicines is almost 15 times as high as purchased drugs and ‘modern’ treatment, and the wide range of wild foods harvested is worth more than 14 times as much as poor households’ annual expenditures on food from the market.*



## Data requirements

### *Treating the environment base as an economic asset*

When preparing to collect data and assemble an evidence base on the economic contribution of the environment to pro-poor economic growth in a country, or for a particular sector or development goal, it is first of all necessary to identify the ecosystems, resources and environmental sectors that are important to a country's economic performance. Here, it is useful to distinguish two "types" of sectors:

- sectors that depend directly on natural resources as their primary output, input or source of raw materials (such as forestry, fisheries, mining, and many industries), and
- sectors where output relies on the broader provision of environmental services (such as the waterflow and quality required for hydropower and irrigation; the soil fertility which underpins agriculture; the landscape features which support tourism; and the water quality and protection against hazards which enable safe human settlement).

It should be borne in mind that these groupings are rarely mutually exclusive. Fisheries, for example, depend directly on natural resources, but at the same time rely on environmental services such as the clean and regular water supplies afforded by catchment forests, and the breeding, nursery and habitat provided by wetlands— and the same holds true for many other sectors that depend on natural resources as their primary input and source of raw materials.

The following, mainly non-monetary, data can be used to provide evidence that the environment is an asset or source of natural capital:

- the type and extent of ecosystems and natural resources, and their location (for example mineral resources, forests, coastal zones, wetlands, grasslands, coral reefs, rivers and lakes, etc.), and
- the type, number and nature of key sectors, industries and economic activities which are linked to environmental goods and services (for example farms and agro-processing, forest enterprises, fisheries, mines, hydropower schemes, nature tourism enterprises, human settlements in areas prone to landslides, floods or storms, etc.).

### *Emphasising the economic returns from environmental investment*

The following, mainly non-monetary, data can be used to provide evidence about the economic return to environmental investment in a particular country, sector or towards a particular development goal:

- information about the production and value of key natural resource sectors (for example timber and non-timber forest products, agriculture, fisheries, minerals and mining, nature tourism, protected areas, etc.);
- information about the production and value of environmental service-dependent sectors (for example irrigation, hydropower, human settlements, etc.);
- information about the contribution of environmental goods and services to non-market benefits (for example clean air and water, food security, energy, shelter, health, reduced vulnerability, drought and emergency coping mechanisms, etc.);
- information about the potential future economic gains from maintaining a stock of environmental goods and services (for example future expansion of particular economic sectors, pharmaceutical, agricultural or industrial applications of wild genes and species, changing consumer and trade demands and preferences, etc.).

### **Understanding human and economic wellbeing outcomes**

The key data required to provide evidence of the human and economic wellbeing outcomes of environmental investment comprise information about the wide variety of that are linked to environmental resources and quality. As before, these data are primarily qualitative, and include:

- information about the different supporting, provisioning, regulating and cultural services that are provided by the country's natural ecosystems (see Figure 2 above for examples of these);
- information about the key elements of human and economic wellbeing which these services support (again, see Figure 2 above for examples);
- information about the ways in which these flows of services and components of human wellbeing are reflected in key indicators of pro-poor economic growth (for example production, consumption, income, revenue generation, cost savings, investment and trade flows, Gross Domestic Product, balance of payments, foreign exchange earnings, access to and availability of water, sanitation, food, shelter, energy, healthcare, etc.).

### **Achieving national economic growth and upholding sectoral output**

#### *Contribution to "visible" economic activities*

Key data relating to the "visible" value of activities in the national economy can be presented via indicators such as:

- Gross Domestic Product (Gross Domestic Product)
- employment rates
- trade balances
- foreign exchange earnings
- investment flows
- public budget figures

Both absolute figures (the income and output generated, number of people employed, exports and foreign exchange earnings, and so on) as well as the percentage contribution of this sector to the overall total (proportion of national income, employment, exports, foreign exchange earnings, and so on) can be provided so as to give an idea both of the magnitude and relative contribution of environment to the economy.

#### *Contribution to "hidden" economic activities*

- Data on household-level, artisanal or small-scale business activities (for example on wild food consumption, fishing, use of biomass energy, earnings from small-scale natural resource enterprises, etc.).
- Sometimes figures can be extrapolated from one particular site to other areas of the country (using appropriate data on population or participation in particular economic activities), or average estimates for the country of per capita or per household natural resource consumption or production (for example firewood use, etc.) can be applied across relevant sectors of the population. It is however always important to be cautious, and sensible, about extrapolating data from one site to other areas— and where this is done, any assumptions made should be made explicit.

#### *The importance of tracing through economic multiplier effects*

- Spending in one part of the economy may lead to increased economic activity and spending in other parts. Although it is difficult to quantify the exact multiplier effect of environmental investment or of the spending that the environment generates, data can be provided to show how these ripple effects occur, and to incorporate the secondary and support activities that are linked to environment-based activities.
- Most environment-based sectors stimulate a broad range of linked economic activities, and at least part of the output from these related industries can be presented as evidence. For instance spending on nature tourism is also reflected in income, employment and earnings in the hotel, transport and handicrafts industries. Another example is that forest products provide the raw materials for a wide range of value-added and processing industries, as do mining, fisheries and other resource-based sectors.
- Some multiplier effects may be almost impossible to trace through or quantify, because their impact is so great (for example the knock-on effects associated with clean and regular water supplies or hydropower energy production). Here, even when hard data cannot be provided, these effects should be mentioned.

### ***The difficulties of attributing national and sectoral economic output to environmental services***

- *Whereas all of the output, income, employment, etc. associated with sectors that depend directly on natural resources can be ascribed to the environment, this is not the case for those that depend primarily on environmental services. To take the case of hydropower, for example, it would not be correct to credit the entire sector's output to forest hydrological services. Only a certain proportion of these values depend on continued water quality and streamflow regulation services, and on protection against downstream siltation and sedimentation.*
- *In some cases specific studies may exist which provide estimates of the monetary worth of environmental services to particular economic activities— and which (with the caveats and cautions mentioned in the paragraph above) may in some cases also be extrapolated more widely.*
- *In most instances such specific data will not however be available. Here, a key challenge is to make realistic assumptions about the level of sectoral income, output, employment or earnings which can be attributed to the presence of environmental services.*
- *In the absence of reliable information about the contribution of the environment to sectoral output, the total contribution of the environmental service-dependent sector to measures such as Gross Domestic Product, employment rates, trade balances, foreign exchange earnings, investment and so on can be cited, in order to underline the broad significance of environment to the economy.*

### ***Generating public revenues***

#### *Direct sources of revenues*

*Many sources of government income are raised from the activities which depend on environmental goods and services, and can be presented as evidence of the contribution of the environment to public revenues, including:*

- *taxes (e.g. on income and profits from environment-based industries and enterprises, taxes on inputs used in environment-based industries and enterprises, retail, sales and value-added taxes on environmental products, airport taxes on nature tourists, etc.);*
- *other levies (e.g. bednight levies on hotels which serve nature tourism destinations, import and export levies for environmental inputs or products, levies for the use of docking or port facilities on nature tourism cruise ships or traders in environmental goods, etc.);*
- *earnings of state-owned enterprises (e.g. those based on forestry, mining, fisheries, etc.);*
- *earnings of public utilities which depend on environmental services (e.g. water, energy, sanitation, etc.);*
- *royalties and earnings from the rental, lease or sale of state-owned products and land areas (e.g. wild product export revenues, sales of minerals, concession fees for nature tourism destinations, lease of fishing lots, timber royalties, hunting royalties, bioprospecting fees, forest concession fees);*
- *fees and charges on resource use (e.g. prospecting licences; firewood collection charges, timber felling fees, non-timber forest product harvesting permits, protected area entry charges, fees for the use of protected area facilities, fisheries licence fees, etc.);*
- *payments for environmental services (e.g. watershed fees, catchment protection charges, levies on water use, sales of carbon credits, etc.).*

*Both absolute figures as well as the percentage share in public revenues for a particular sector or to the national economy as a whole can be provided so as to give an idea both of the magnitude and relative contribution of the environment.*

#### *The importance of considering multiplier effects*

- *As above, data should be presented wherever possible both from indirect sources of environment-related public revenues (for example tax earnings from the hotels and restaurants which support a nature tourism industry, or accrue from natural resource processing industries), as well as in relation to the multiplier effects of government income earned from the environment.*

#### *The difficulties of attributing public revenues to environmental services*

- *As above, caution, common sense and expert opinion must be exercised when deciding what proportion of public revenues can be attributed when the output of the activity or sector under question depends on the provision of environmental services.*

### Reducing expenditures

#### Key sources of environmental costs to the economy

- Depletion of economically valuable resources, species and products (for example through over-exploitation or the use of destructive harvesting techniques),
- Degradation of habitats and ecosystems which provide economically valuable environmental services: either directly (for example through pollution, unsustainable land and resource management or conversion to other uses) or indirectly (for example through interfering with the hydrological regime or water quality of rivers and streams feeding a particular site, reducing the biological diversity of a given area, or introducing alien invasive species which interfere with habitat composition and functioning),
- Other sources of air, land, water, noise and visual pollution which incur costs to humans and to the economy through compromising environmental quality.

#### Maintaining future streams of economic benefits

- One element of cost avoidance is the maintenance of the flows of income, employment, earnings and economic activity already mentioned in the sections above. There is no need to repeat these data, but it should be underlined that environmental degradation will be reflected in a decline or loss of some or all of these indicators

#### Avoiding other costs, losses and expenditures

A broad range of other data can be presented which provide evidence that environmental degradation— or insufficient environmental investment— is manifested as costs and losses to the economy, including:

- Production losses— data on the reduced employment, output and earnings that occur when production is affected by the loss of important environmental inputs or services. Examples include the decrease in the lifespan of a hydropower scheme (and thus its output and income) as a result of sedimentation and siltation, reductions in agricultural output as a result of the loss of irrigation water or soil fertility, declines in fisheries catch as a result of over-exploitation of the stock, reduced non-timber forest products harvesting occurring through the conversion of forest habitat or loss of biodiversity, reduced livestock yield resulting from land and water pollution, etc.
- Physical damage costs— data on the loss of infrastructure, production and other assets as a result of poor environmental quality or environmental disasters. Examples include the value of roads, bridges, buildings and crops washed away as a result of flooding arising from the loss of upstream wetlands, storm damage to ports and coastal settlements which are no longer protected by mangroves and reefs, the losses incurred to rural communities through landslides caused by upland deforestation, etc.
- The necessity of making expenditures to mitigate or avert the effects of environmental degradation— data on the cash outlays that government, private sector or the general public must make to cope with the effects of environmental damage. Examples include the costs of resettling affected populations, medical expenditures to cope with the human health problems arising from environmental pollution, purchasing bottled water when other sources become polluted, establishing flood control measures, installing groynes, barricades and levies to offset the effects of increased storm damage on unprotected shorelines, etc.
- Costs of replacing lost or degraded environmental goods and services— data on the purchased technologies and products people must use as replacements or substitutes for environmental goods and services. Examples include purchasing foods to replace wild food sources for humans or livestock, utilising kerosene instead of firewood or coal-fired power plants instead of hydro schemes, putting in artificial water reservoirs and purification plants instead of relying wetland water storage treatment services, installing on-farm measures to check sedimentation and siltation rather than relying on forest catchment protection, etc.
- Knock-on impacts on other prices— data on the prices of other goods and services that are affected by a decline in environmental quality. Examples include lower house prices in areas which have become highly polluted or where landscape quality has declined, increased food prices arising from a decline in production caused by environmental degradation, rising costs of raw materials due to over-exploitation and reduced availability.

#### The difficulties of attributing costs to environmental degradation

- Generally, it is difficult to predict what magnitude of losses or costs will occur as a result of environmental degradation unless you have access to real-world data from instances where a particular event has actually occurred. In many cases the data being presented relies on many assumptions, these assumptions must always be made explicit.

- *As above, caution, common sense and expert opinion must be exercised when deciding what proportion of economic costs and losses can be attributed to environmental damage. The relationship between environmental quality and physical effects is complex, and it is not always easy to isolate what proportion of a disaster, change in production or consumption, or change in other conditions is linked to changes in the environment.*

### ***Alleviating and reducing poverty***

#### *Accessing economic data on economic aspects of poverty-environment linkages*

- *Although in most countries it is relatively easy to access information both on the incidence of poverty overall at the national and sub-national levels and on the criteria used to determine poverty, there tend to be very few sources of economic data on poverty-environment linkages.*
- *Detailed studies carried out on a specific topic or in a particular location (for example the role of forest products in the livelihoods of the poor, the relative contribution of different income and expenditure items for different socio-economic groups, the economic significance of environmental goods and services in times of emergency or stress, etc.) are usually the most readily-available source of economics data relating to poverty. Even these sources tend to more often contain qualitative information than quantitative data.*
- *For these reasons, accessing quantitative figures on the contribution of environmental investment to alleviating and reducing poverty often requires that primary data collection is carried out, and new studies commissioned.*
- *When attempting to extrapolate the findings of studies carried out in one place to another situation, it is necessary to be even more cautious than would usually be the case. Economics data relating to poverty are particularly hard to generalise, and are usually context-specific.*

#### *The reliance of the poor on environmental goods and services*

- *Household socio-economic surveys or income and expenditure surveys which identify the main components of household production and consumption tend to be good sources of evidence about the reliance of the poor on environmental goods and services, and the ways that they are affected by environmental degradation and loss.*
- *They are particularly useful when they also contain information which permits stratification according to relative wealth status. It is often possible to obtain the raw data sets of household surveys which have been carried out for other purposes, and reanalyse the data so as to determine relative reliance on environmental goods and services, and their role in livelihoods, for different socio-economic groups.*

#### *Environmental investment as a mechanism for poverty reduction*

- *Data to provide evidence on the opportunities for environmental investment to reduce poverty (either through generating income, employment and other benefits or through reversing environmental degradation) usually rely on case studies of particular development efforts (for example environmental enterprise development, natural resource value-added and processing activities, introduction of new resource-based income and employment generating endeavours, replanting of forest cover, wetland restoration etc.).*
- *Project, enterprise and investment feasibility studies and appraisals provide a particularly good source of data on the potential for converting environmental resources in to poverty reduction benefits. In most cases they contain both projections of potential income and benefits to be gained from undertaking the activity, as well as a detailed identification of stakeholder groups and beneficiaries.*
- *Evaluation studies of projects which have already been carried out can also yield important, and convincing, data about the actual poverty gains from generating income and other benefits from the environment, and the impact of activities on the status of the poor and the incidence of poverty.*

### **Meeting the MDGs**

*Providing evidence that environmental investment contributes to meeting the Millennium Development Goals does not usually require generating new data. Rather, it necessitates repackaging the data described above, and phrasing them in terms of the specific concerns articulated in the MDGs. Some of the most obvious sets of data to present relate to the role of the environment in:*

- *Poverty eradication (MDG1)— much of the data described in the previous section on alleviating and reducing poverty.*
- *Food security and hunger (MDG1)— data on public and private costs avoided in relation to alternative food sources, data on alleviating and reducing poverty in relation to the reliance of the poor on wild foods, including in times of emergency and stress, data on the role of the environment in achieving national economic growth and upholding sectoral output in relation to support to agriculture, livestock and fisheries sectors.*
- *Gender equality and women's empowerment (MDG 3)— data on alleviating and reducing poverty in relation to women's reliance on environment-based sources of subsistence and income.*
- *Human health and disease reduction (MDG 4, 5, 6)— data on public and private costs avoided in relation to environmental health risks, data on alleviating and reducing poverty in relation to the reliance of the poor on wild plant and animal based medicines.*
- *Sustainable development (MDG 7)— data on the role of the environment in achieving national economic growth, upholding sectoral output, and generating public revenues.*
- *Water and sanitation (MDG 7)— data on public and private costs avoided in relation to poor water quality and availability; and on alleviating and reducing poverty in relation to the reliance of the poor on environmental water services.*
- *Urban slum dwellers (MDG 7)— data on public and private costs avoided and on alleviating and reducing poverty in relation to the environmental provision of urban life support services, and protection of human settlements.*

## Preparing the evidence base

### Summary of steps and data needs

This section of the primer identifies the sources from which data can be obtained to provide evidence for the contribution of the environment to pro-poor economic growth. The steps and data needs in making an economic case for mainstreaming the environment into national and sectoral development processes are summarised in Figure 5, which draws on the more detailed guidance presented in the preceding sections of the primer.

Figure 5: Summary of steps and data needs in making an economic case for environmental investment

Step	Data needs
<b>Framing the argument – emphasis on more qualitative data</b>	
Treating the environment base as an economic asset	<ul style="list-style-type: none"> <li>Type and extent of environmental resources and their location</li> <li>Type, number and nature of key sectors, industries and economic activities that are linked to environmental goods and services</li> </ul>
Emphasising the economic returns from environmental investment	<ul style="list-style-type: none"> <li>Production and value of environment -related sectors</li> <li>Contribution of environmental goods and services to non -market benefits and quality of life benefits</li> <li>Potential future applications and uses of environmental goods and services</li> </ul>
Understanding human and economic wellbeing outcomes	<ul style="list-style-type: none"> <li>List of supporting, provisioning, regulating and cultural services provided by environment</li> <li>Key elements of human and economic wellbeing supported by these services</li> <li>Key indicators of pro-poor economic growth linked to goods services and wellbeing</li> </ul>
<b>Providing the evidence – emphasis on more quantitative data</b>	
Achieving national economic growth and upholding sectoral output	<ul style="list-style-type: none"> <li>Contribution to “visible ” economic activities: GDP, employment, trade, foreign exchange, investment, public budget</li> <li>Contribution to “hidden ” economic activities: income employment trade foreign exchange, investment</li> <li>Multiplier effects and knock -on effects on other spending income and output</li> </ul>
Generating public revenues	<ul style="list-style-type: none"> <li>Direct sources of revenue: taxes; other levies; SOE earnings; public utility revenues; royalties and earnings from the rental, lease or sale of state-owned products and land areas; fees and charges on resource use; payments for environmental services</li> <li>Revenues from secondary and support industries</li> </ul>
Avoiding public and private costs	<ul style="list-style-type: none"> <li>Maintaining future streams of benefits</li> <li>Production losses</li> <li>Physical damage costs</li> <li>Mitigative and avertive expenditures</li> <li>Replacement costs</li> <li>Impacts on other prices</li> </ul>
Alleviating and reducing poverty	<ul style="list-style-type: none"> <li>Examples of the reliance of the poor on environmental goods and services</li> <li>Examples of environmental investment as a mechanism for poverty reduction</li> </ul>
Meeting the MDGs	<ul style="list-style-type: none"> <li>Poverty eradication (MDG1)</li> <li>Food security and hunger (MDG1)</li> <li>Gender equality and women’s empowerment (MDG 3)</li> <li>Human health and disease reduction (MDG 4, 5, 6)</li> <li>Sustainable development (MDG 7)</li> <li>Water and sanitation (MDG 7)</li> <li>Urban slum dwellers (MDG 7)</li> </ul>

## Key points in data compilation

As outlined in the preceding sections of the primer, a wide variety of data can be used to support the economic case for mainstreaming the environment into national and sectoral development processes. These include information which is both qualitative and quantitative, general and specific, from the country under consideration and from international experience.

To a large extent the types of data that you use to back up your argument will be determined by the depth and purpose of your interactions with economic decision-makers, their interests and agenda, and the nature of the topic that you wish to address. Data needs range from “quick and dirty” figures (which can be quickly and easily assembled) to the results of detailed studies and analyses (which can require substantial time and resources to collect).

This primer focuses primarily on situations where PEI country staff and counterparts need to prepare quickly for meetings with economic decision-makers and planners, and thus have to rapidly assemble key data, evidence and arguments. Some guidance is however given in the next part of the primer on commissioning more detailed studies in environment-economic-poverty linkages.

Certain general points and principles relating to the preparation of the evidence base on the contribution of the environment to pro-poor economic growth should be re-emphasised and reiterated:

- Sustainability is always a key concern. There are immediate short-term values to be gained from exploiting the environmental resource base. However, if this use and management is not sustainable, such economic and financial flows cannot be maintained over the long-term—and cannot be treated as a return from environmental investment. Care should be taken in ensuring that economic-environmental links that are expressed are based on sustainable management and use.
- When presenting specific evidence to demonstrate how environmental investment contributes to pro-poor economic growth, a range of both qualitative and quantitative data should be used. These should cover both formal, marketed income and production (the values that tend to be “visible” in official statistics and records) as well as those that are associated with the informal sector and non-marketed income and production (usually “hidden” values).
- It is necessary to distinguish between sectors that depend directly on natural resources as their primary output, input or source of raw materials (such as forestry, fisheries, mining, and many industries), and sectors which rely on the broader provision of environmental services (such as the waterflow and quality required for hydropower and irrigation; the soil fertility which underpins agriculture; the landscape features which support tourism; and the water quality and protection against hazards which enable safe human settlement). Whereas all of the income, earnings, employment and so on associated with sectors that depend directly on natural resources can be ascribed to the environment, this is not the case for and those where output depends on environmental services. For the latter, expert consultation is usually required to determine the extent to which pro-poor economic growth indicators depend on environmental status.
- Although it is difficult to quantify the exact multiplier effect of environmental investment or of the spending that the environment generates, both qualitative and quantitative data should be provided to show how these ripple effects occur, and to express the economic importance of secondary and support activities that are linked to environment-based activities.
- Distributional aspects of the data being presented should be emphasised. As the overriding focus of the evidence you are presenting is to show how the environment contributes to pro-poor economic growth, data about the economic significance of the environment to the poor are particularly important to your case. The way in which environmental benefits and costs are distributed between different groups, and the gainers and losers from environmental investment and environmental degradation, should be emphasised, especially the poorest and most vulnerable groups.
- It is important to emphasise trends and changes over time. Your evidence should not be just a snapshot of the current situation, but rather an explanation of how environmental investment will lead to improvements in pro-poor economic growth (or, conversely, that environmental

degradation will lead to a worsening of economic growth and poverty indicators). Similarly, different scenarios can be presented as regards the costs and benefits of different levels of environmental investment. If time, resources and expertise are available, a detailed baseline and modelling of future scenarios can be carried out. If your evidence needs to be prepared more quickly, the data you are presenting should at least be explained in terms of the environmental implications of current trends in production and consumption, and the effects of macroeconomic and sectoral policies.

- It is important to recognise the limitations of economic arguments. Although data on the economic importance of the environment for pro-poor economic growth are extremely useful, and usually prove convincing to decision-makers, alone they are rarely sufficient to change policy and practice. Evidence from other disciplines, and high-level political will, are also required.

## Where to access

In preparing your evidence base you will typically draw on a wide variety of data sources. One of the main reasons that extra effort needs to be made to present the economic case for mainstreaming the environment into national and sectoral development processes is that the links between the environment and pro-poor growth are poorly documented and not well understood. A corollary of this is that there are as yet very few specific data which deal explicitly with environment-economy-poverty linkages, especially quantified figures and country-level information.

Building an evidence base will typically involve both interpreting existing data in new ways (e.g. why watersheds matter for hydropower) and collecting and analysing new data (e.g. the dependence of poor households on natural resources). Where time and resources are a constraint, you will probably rely more on the reinterpretation of existing data. In cases where a more concerted, longer-term efforts is being made to build an evidence base, it may be possible to collect new data, and commission detailed studies to provide you with the information you need.

As in many cases the demands and opportunities to present evidence to decision-makers arise rapidly, with little prior notice or planning, it is often useful to take time to review available data and information and to compile a simple database of key facts and figures that can be drawn on as and when the need arises.

## Existing economic, environmental and poverty statistics

Existing country economic and development statistics provide some of the richest, most useful and widely available sources of basic data on the environment and economy. These are listed in Table 3, and include government reports and yearbooks from Ministries of Finance and Economic Planning, Line Ministries and Central Bureaux of Statistics, as well as donor country economic and environmental reports.

These published reports are in most instances easily accessible, and can be obtained online. More detailed or disaggregated statistics, or historical information, can usually be obtained by requesting raw data from the relevant departments of these agencies

These information sources contain macroeconomic and sectoral data on key economic and poverty indicators, and for the most part refer only to formal sector activities. In most cases some simple reinterpretation and additional analysis is required to provide evidence of the contribution of the environment to pro-poor economic growth. Most basically, work needs to be done to single out particular sectors or sources of income and revenues that are linked to the environment. Detailed analysis (which often requires going back to the raw source data that have been used to compile these statistics) can be carried out if time permits, in order to provide a more sophisticated understanding or disaggregated data about specific environmental, economic and poverty linkages and indicators.

## Case studies on specific linkages between the environment, economy and poverty

Country, sector or site-level data explicitly concerned with poverty and environment and economy come from a wide variety of sources, and encompass both published documents and “grey” literature such as project reports, technical materials and academic papers.

It is difficult to generalise about where these data will exist for different countries, and a web search with appropriate keywords is often the most effective way of identifying relevant reports and data sources. Section 5 of the primer provides a list of useful references and internet resources. Other in-country sources of such data include socio-economic surveys carried out by government, donors and researchers; government, donor and private sector project appraisal, technical and evaluation reports; as well as Masters and PhD theses and academic papers prepared by national universities.

Several international universities, research institutes and networks have produced case studies on environment-economic-poverty linkages which contain valuable data. These can be accessed through their websites, newsletters and journals. In several regions there exist regional networks for development and environmental economics which produce regular research reports, policy briefs and conference proceedings on poverty, economics and the environment. Section 5 of the primer gives further guidance on accessing the websites of networks in Africa, Latin America & the Caribbean, Middle East & North Africa, South Asia and Southeast Asia.

Table 3: Existing sources of data

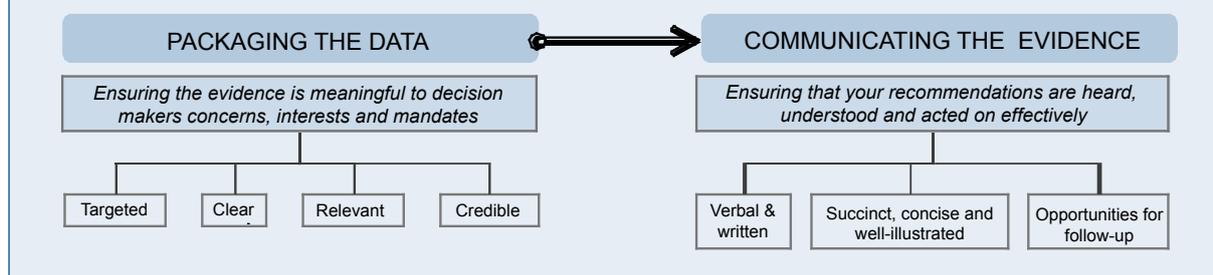
Information	Key sources of data
Macro-economic and sectoral output, income, employment, trade and investment	<ul style="list-style-type: none"> <li>• Government statistical yearbooks</li> <li>• Annual statistical reports of Ministries of Finance and Economic Planning</li> <li>• Annual reports of relevant line ministries</li> <li>• Annual reports of state-owned enterprises and public utilities</li> <li>• Provincial and District statistical yearbooks and annual economic/development reports</li> <li>• World Bank, Multilateral Development Bank (ADB, AfDB, IADB, EBRD, etc.) and Bilateral Donor country economic reports</li> <li>• IMF Selected Issues and Statistical Appendix reports <a href="http://www.imf.org/external/country/index.htm">http://www.imf.org/external/country/index.htm</a></li> <li>• World Bank online databases of country economic and development statistics and “Country At A Glance” tables <a href="http://go.worldbank.org/1SF48T40L0">http://go.worldbank.org/1SF48T40L0</a></li> </ul>
Public revenues	<ul style="list-style-type: none"> <li>• Government public investment plans</li> <li>• Government medium-term expenditure plans and reviews</li> <li>• Government statistical yearbooks</li> </ul>
Environment and poverty	<ul style="list-style-type: none"> <li>• National poverty assessments</li> <li>• National State of the Environment Reports</li> <li>• Poverty Reduction Strategy Papers</li> <li>• National and sub-national income-expenditure surveys</li> <li>• Multilateral Development Bank (ADB, AfDB, IADB, EBRD, World Bank, etc.) and Bilateral Donor country environmental assessments</li> <li>• UNDP annual Human Development Report and Country Human Development Reports <a href="http://hdr.undp.org/en/">http://hdr.undp.org/en/</a></li> <li>• World Bank annual World Development Report <a href="http://www.worldbank.org/wdr2008">http://www.worldbank.org/wdr2008</a></li> </ul>

## Making the case

### Summary

However good the data and evidence that you collect are, they will have little impact or influence over decision-makers unless they are packaged carefully and communicated effectively, so as to make a persuasive economic case for mainstreaming the environment into national and sectoral development processes. This section of the primer goes through strategies that can be used to package and communicate evidence in a form that is credible and convincing. Key points to bear in mind are summarised in Figure 6.

Figure 6: environmental economic assets, flows and outcomes



### Converting data to arguments

Presenting a list of figures and statistics— comprising raw or analysed data— is not the same as providing information. In addition to ensuring that the information you present is practical and policy-relevant, and is communicated effectively (see the sections below), effort is required to use the data that you have collected to put together a well-structured argument:

- From the start, be clear about the points you want to make and the arguments you are trying to support with economic figures, statistics and examples.
- Think carefully about the steps in logic that are required to build this case, and summarise the key data which proves, demonstrates or illustrates each stage of your line of reasoning.
- Identify any potential inconsistencies or sources of ambiguity in the data you are putting together, and be prepared to defend the particular interpretations you have made and conclusions you have drawn.
- Remember that your argument revolves around the statements you are making, not the qualitative or quantitative data alone. Statistics and figures should be used to back up and illustrate your reasoning, and to confirm your arguments, and always require careful explanation.

### Packaging the data and making it meaningful to the policy agenda

Arguments for environmental investment will have little resonance with decision-makers if they are not meaningful and relevant to their concerns and interests, and to the mandates and policy goals they have been charged with fulfilling. Key points to bear in mind when putting together the case for environmental investment is that data should be packaged and presented so it is targeted, clear, relevant and credible:

- **Your presentation should be well-planned and targeted.**
  - This means having a clear idea, from the start, of the reasons why you are making an economic case for environmental investment, and who you are making this case to.
  - As a broad principle, you want to ensure that your messages reach an audience who is both willing and able to effect changes in policies, programmes and budgets, and in the way in which national and sectoral development processes. Your target audience is the

individuals and institutions who actually have the power to make decisions— ideally senior decision-makers themselves, or the people who advise the people who make decisions. In most cases the intended recipients of economic evidence for environmental investment are representatives from the ministries of Finance, Planning, Treasuries, Sectoral Line Agencies and Local Authorities.

- **It is important to ensure that the argument you are making is extremely clear— both to you and to the decision-maker(s) you are attempting to influence.**
  - If you are confused about what exactly you want to say, and what evidence is required to back this up, then there is little doubt that your audience will also be confused— and unlikely to be convinced by your arguments.
  - This necessitates first of all determining what you want to achieve from your interactions with the decision-makers, and on the basis of this thinking carefully through your approach, assessing the main lines of reasoning you are going to use and the key messages you want to convey, and then being extremely clear about the steps in this argument and the supporting data or evidence that are required.
- **Keep your evidence relevant.**
  - This means making sure that you provide only the information which is necessary to support your arguments. There is often a temptation to overwhelm your audience with information, and mention every fact collected which relates to poverty, the economy and the environment— which in most cases just serves to confuse the issues, and dilute the points that you are trying to make. Be specific, and selective with the information you prepare and share.
  - Particular attention should be given to presenting data on the key sectors, services and indicators that matter to policy goals in the country that is being discussed, to the sector or background that the decision-maker you are speaking to comes from, and to topical issues which are at the forefront of public policy or news. Speaking to a representative from the Agriculture Ministry, for example, may warrant emphasising the economic significance of croplands and pasturelands, of the ecosystems which contain wild plant relatives and pollinator insects, and the forest ecosystems that protect catchments that supply irrigation water. In contrast, a member of the Ministry of Finance or Economic Planning may find it most convincing to be told about the links between environmental assets, flows of goods and services, and outcomes and indicators that relate to the overall health of the economy, and from sectors which have been prioritised for particular policy attention or as key areas of growth.
- **The evidence you present must be credible.**
  - This requires being confident about the veracity and accuracy of the data that you are using, and making sure your own logic and workings are correct.
  - In most cases, decision-makers will find information more convincing when it is based on real-world experiences and data, preferably drawn from the country or sector that they represent. Examples from other sectors or parts of the world can be useful in illustrating general points and backing up country-specific arguments, but should be used selectively.
  - Your own credibility as an advocate of environmental investment also matters— and in some situations you may not be the best, or the only, person to present the economic case for mainstreaming the environment into national and sectoral development processes. There is often a great deal of value in seeking the support of a “champion” to help prepare or present your arguments— somebody who has influence and credibility with the decision-maker you are talking to, such as a well-known expert on the topic, a professional with an economics or finance background, or a senior official from the public policy or political arena.
  - It should also be noted that the involvement of key people from the decision-maker’s own ministry or agency in the preparation and presentation of the economic case for environmental investment can often pay dividends in ensuring that the arguments

presented are considered credible by your audience. If decision-makers feel they have been involved in the process, and it accurately reflects their perspectives and interests, they are far more likely to have an interest in taking its results into account when they make decisions.

## Communicating the evidence

However good your data, evidence and arguments are, they will have little impact if they are not heard, understood and acted on. Effective communication of the economic case for mainstreaming the environment into national and sectoral development processes is essential, and wherever possible you should endeavour to engage the assistance of communications professionals who can help you to convey your messages successfully. Although the most appropriate way to communicate your messages to decision-makers will of course depend on the country, sector and target audience with whom you are working, general principles to follow include:

- **A combination of verbal presentation and written materials are usually required**—the former to engage the decision-maker's immediate attention, and the latter to provide them with material to take away and share with others or to brief themselves prior to your meeting.
- **Your verbal presentation should be succinct, concise and well illustrated.**
  - Powerpoint presentations are a valuable media for imparting information, but they are only tools for getting a particular message across. The ultimate impact of your presentation depends on your ability to deliver your messages clearly and to retain the engagement and interest of your audience.
  - In most instances, the more visual representations of your evidence and messages you can provide, the easier it is for your audience to absorb and understand the messages you are presenting to them. Simple diagrams, charts and graphs, and short case studies which illustrate how a key message actually plays out in the real world, can usually make points much more clearly than lengthy speeches, and have the additional advantage that they are more likely to stick in the audience's memory after the event.
- **Lengthy technical reports are not usually effective ways of getting messages across.**
  - Decision-makers are busy people with many topics and issues occupying them. Your concern is just one of many that they are considering, and it is unlikely that they will have either the time or the interest to distil information and recommendations from a long document.
  - The evidence collected should be summarised in a short 2-3 page brief, clearly outlining the key messages and recommendations you want to put across.
  - As with verbal presentations, real-world case studies, diagrams and charts provide an effective and attractive means of transmitting written information.
- **Provide opportunities for follow-up, which allow the decision-maker you are interacting with to obtain additional information or seek clarification after your meeting.**
  - More detailed technical information on the topics you have been discussing should be available, and these references given at the time of the meeting. This may be a website, a set of in-depth technical reports, or arrangements for a second meeting— for the decision-makers themselves, or which their staff can follow up on.
  - Do not expect a decision-maker to always make the first move in contacting you to follow up on issues: be proactive in following up meetings with emails, phone calls and other reminders so as to ensure that your recommendations stay at the forefront of decision-makers' minds and agendas.

## Recognising the limitations of economic arguments

Economic arguments, data and decision-makers are influential in shaping development and economic agendas, and in influencing how land, resource and investment choices are made. There are, however,

not the sole influence: many other factors determine decision-making, and shape policy, implementation and budget agendas. A wide range of technical, institutional, social and political goals and arguments must also be considered, and weighed against environmental economic concerns.

Multiple stakeholders, institutions, interests and agendas impinge on environmental and economic decision-making— and it cannot always be assumed that public decision-makers always act solely in the public interest. Rather, the economic case for environmental investment is usually being presented in situations where decision-makers are balancing multiple needs and interests, and are subject to many (and sometimes conflicting) mandates and influences. As described at the beginning of this primer, the concept of trade-offs and competing demands on the environment and natural resources is key— and providing the economic and development arguments for environmental investment may in some cases be seen as undermining the current status quo and ways of making decisions.

Making the economic case is therefore rarely sufficient, alone, to influence decision-making in favour of the environment. It does, however, present a series of arguments which are based around indicators and policy goals which have resonance with decision-makers in finance ministries, treasuries, sectoral line agencies and local authorities. It also permits the environment to be considered on a more equal basis with other sectors when policies are formulated, land and resource choices made, investments planned and budgets allocated.

## List of key terms, references and websites

There is now a growing body of literature on environmental aspects of pro-poor economic growth. Key references are given below which contain particularly useful data or case studies which have potential use for making an economic case for mainstreaming the environment into national and sectoral development processes - overall, or for specific countries and sectors.

There is such a huge number of publications on the economic value of the environment, the costs of environmental degradation and the links between environment and poverty for key sectors, sites and countries, that they cannot all be included in this document. This reference list contains only publications relating specifically to economics, the environment and poverty.

### Glossary of key economic terms used in the document

<b>Asset</b>	Property or goods having commercial, exchange or earning value that are owned by a business, institution or individual.
<b>Capital</b>	Accumulated money, goods or wealth owned by a person or organization or invested, lent, or borrowed, which is used to produce income or other services. Economists commonly describe capital as one of the four essential ingredients of economic activity, alongside land, labour and enterprise. Capital may take many forms, for example physical or built, human, social, financial, institutional and natural.
<b>Economic growth</b>	Sustained increases in the real Gross Domestic Product of an economy over time, the increase in a country's capacity to produce goods and services which brings about a rise in national output, income and standards of living.
<b>Environmental investment</b>	In this document, the effort, attention and material support accorded to environmental sustainability in public budgets, policies and planning. This includes ensuring that sufficient government funds are allocated to the agencies responsible for environmental management and conservation; that environmental goals are prioritised and incorporated into (and not undermined by) macroeconomic and sectoral policies and the instruments that are used to achieve them; and that economic and development projects and programmes factor environmental costs and benefits into their calculations, and do not impact negatively on the environment.
<b>Gross Domestic Product</b>	A measure of economic activity in a country. Defined by the World Bank as the sum of gross value added, at purchaser prices converted at market exchange rates to current US Dollars, by all resident producers in the economy plus any product taxes (less subsidies) not included in the valuation of output. It is calculated without deducting for depreciation of fabricated capital assets or for depletion and degradation of natural resources.
<b>Multiplier effect</b>	The ratio of change in an endogenous variable to the change in an exogenous variable: usually refers to the way in which a change in spending produces an even larger change in total spending, income, output, employment, etc.
<b>Pro-poor economic growth</b>	According to the OECD 2008, this concept focuses attention on the extent to which poor women and men are able to participate in, contribute to, and benefit from economic growth, as measured by changes in the incomes of the households in which they live and the assets they and their children acquire to earn higher incomes in the future.

**Return**                    The reward for undertaking business or investments, including cash profits, income or non-material benefits.

### **General references on the environment and pro-poor economic growth**

- Bass, S. and P. Steele, 2006, Managing the Environment for Development and to Sustain Pro-poor Growth. IDS Bulletin 37(3): 7-16
- Bass, S., 2006, Making Poverty Reduction Irreversible: development implications of the Millennium Ecosystem Assessment. IIED Briefing Paper, International Institute for Environment and Development, London.
- Dasgupta, P., 1997, Environmental and Resource Economics in the World of the Poor. Resources for the Future, Washington DC.
- DFID, 2004, Contribution of the environment and natural resources to pro-poor growth: a checklist examining these issues within a poverty reduction strategy. Policy Division How To Note, UK Department for International Development, London.
- Drakenberg, O., Mattson, K.D., Dahlberg, E., Paulsen, S., Andresson, J. and E. Wickström, forthcoming, Money matters: Making the economic case for improved management of environment and natural resources management in national development planning. Department of Economics, Göteborg University.
- Duraiappah, A., 1996, Poverty and Environmental Degradation: a Literature Review and Analysis. CREED Working Paper Series No 8, International Institute for Environment and Development, London.
- Economist, 2008, How green is their growth? The Economist online, Jan 24th 2008
- Emerton, L., 2008, Investing in ecosystems as poverty reduction infrastructure. International Union for Conservation of Nature (IUCN), Gland.
- GRID-Arenal, 2008, Environment and Poverty Times #5: Pro-poor growth issue. United Nations Environment Programme, Nairobi.
- Hansen, S., 2007, The Economic Case for Investing in Environment A Review of Policies, Practice and Impacts of relevance to Norwegian Partner Countries. Norad Report 6a/2007 Discussion, Oslo.
- IUCN, 2006, Investing in Environmental Wealth for Poverty Reduction: Annotated Bibliography. Prepared on behalf of the Poverty-Environment Partnership, IUCN The World Conservation Union, Gland.
- OECD, 2008, Pro-Poor Growth and Natural Resources: the Economics and Politics. Development Cooperation Directorate, Development Assistance Committee, OECD, Paris
- Reed, D., 2004, WWF– Poverty is Not a Number, Environment is Not a Butterfly. Macroeconomics for Sustainable Development Program Office, WorldWide Fund for Nature, Washington DC.
- World Bank, 2006, Where is the Wealth of Nations Measuring Capital for the 21st Century. World Bank, Washington DC
- World Resources Institute (WRI) in collaboration with United Nations Development Programme, United Nations Environment Programme, and World Bank, 2005, World Resources 2005: The Wealth of the Poor— Managing Ecosystems to Fight Poverty. WRI, Washington DC.

## Websites which contain data and case studies on the economic contribution of the environment to pro-poor economic growth

Centre for Environmental Economics and Policy in Africa publications:

<http://www.ceepa.co.za/>

Conservation International environmental valuation case study database:

<http://www.consvalmap.org/>

Ecosystem valuation website:

<http://www.ecosystemvaluation.org/>

EcoValue:

<http://ecovalue.uvm.edu/evp/default.asp>

Environment and Economy Programme for Southeast Asia publications:

[http://www.idrc.ca/en/ev-23223-201-1-DO\\_TOPIC.html](http://www.idrc.ca/en/ev-23223-201-1-DO_TOPIC.html)

Environment for Development initiative publications:

<http://www.efdinitiative.org/research/publications>

Environmental valuation and cost benefit analysis website:

<http://www.costbenefitanalysis.org/>

Environmental Valuation Reference Inventory:

<http://www.evri.ca/english/default.htm>

IUCN biodiversity economics online library:

<http://biodiversityeconomics.org/library/index.html>

Latin America and Caribbean Environmental Economics Programme publications:

<http://www.laceep.org/>

Middle East and North Africa Network for Environmental Economics publications:

<http://www.bibalex.org/MENANEE/Home/StaticPage.aspx?page=15>

Nature Valuation and Financing Network:

<http://www.eyes4earth.org/casebase/fulltext.shtml?x=537>

New South Wales Government searchable environmental valuation database:

<http://www.environment.nsw.gov.au/envalue/>

Poverty Environment Partnership publications:

<http://www.povertyenvironment.net/pep/>

Poverty Reduction and Environmental Management (PREM) programme publications

<http://www.prem-online.org/index.php?p=publications&a=project>

South Asia Network for Development and Environmental Economics publications:

<http://www.sandeeonline.org/>

United Nations Statistical Division searchable archive of publications on environmental-economic accounting:

<http://unstats.un.org/unsd/envaccounting/ceea/archive/Introduction.asp>

World Bank environmental economics and indicators publications:

<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/EXTTEEI/>

## References and notes

- 1 Steele, P., Pers. Comm.
- 2 Saraff, M., 2004, Assessing the Costs of Environmental Degradation in the Middle East and North Africa Region. Environment Strategy Notes No. 9, The World Bank, Washington DC.
- 3 Drakenberg, O., Mattson, K.D., Dahlberg, E., Paulsen, S., Andresson, J. and E. Wickström, forthcoming, Money matters: Making the economic case for improved management of environment and natural resources management in national development planning. Department of Economics, Göteborg University.
- 4 Drakenberg et al, forthcoming.
- 5 World Bank, 2006, Where is the Wealth of Nations? Measuring Capital for the 21st Century. The World Bank, Washington DC.
- 6 Ibid.
- 7 Ibid.
- 8 World Resources Institute (WRI) in collaboration with United Nations Development Programme, United Nations Environment Programme, and World Bank, 2005, World Resources 2005: The Wealth of the Poor— Managing Ecosystems to Fight Poverty. WRI, Washington DC.
- 9 Adger, N., Brown, K., Cervigni, R., and D. Moran, 1994, Towards estimating total economic value of forests in Mexico. CSERGE Working Paper GEC 94-21, Centre for Social and Economic Research on the Global Environment, London.
- 10 Gallai, N., Salles, J-M, Settele, J. and B.E. Vaissière, 2007. Economic valuation of the vulnerability of world agriculture confronted to pollinator decline. Draft manuscript, Institut National de la Recherche Agronomique, Paris; Sumner, D. A. and H. Boriss, 2006, Bee-conomics and the Leap in Pollination Fees. Giannini Foundation of Agricultural Economics, University of California.
- 11 UNDP 2007/2008 Human Development Report, Fighting climate change: Human Solidarity in a divided world,
- 12 UNFCCC December 2008 Summary of Finance Ministers workshop, Poznan, December 2008 <http://www.warsaw2008hlc.pl/files/HLE%20Summary.pdf>
- 13 OECD, 2008, Pro-Poor Growth and Natural Resources: the Economics and Politics. Development Cooperation Directorate, Development Assistance Committee, Organisation for Economic Cooperation and Development, Paris.
- 14 Ibid.
- 15 Ibid.
- 16 Ibid.
- 17 Emerton, L. 2006. Counting coastal ecosystems as an economic part of development infrastructure, Ecosystems and Livelihoods Group Asia, World Conservation Union (IUCN), Colombo; WTTC, 2005, Media and Resource Centre, World Travel & Tourism Council.
- 18 Emerton, L., 1997, Economic Assessment of Seychelles Biodiversity, Conservation and National Parks Section, Division of Environment, Ministry of Foreign Affairs, Planning and Environment, Republic of Seychelles, Mahé.
- 19 OECD 2008, Pro-Poor Growth and Natural Resources: the Economics and Politics. Development Cooperation Directorate, Development Assistance Committee, Organisation for Economic Cooperation and Development, Paris.
- 20 Emerton, L., Bouttavong, S., Kettavong, L., Manivong, S. and Sivannavong, S., 2002, Lao PDR Biodiversity: Economic Assessment, Science, Technology and Environment Agency, Vientiane
- 21 Emerton, L., 2005, Making the Economic Links Between Biodiversity and Poverty Reduction: The Case of Lao PDR, IUCN – The World Conservation Union, Ecosystems and Livelihoods Group Asia, Colombo.

- 22 Squandered Wealth, Ecoforum 24(1) January 2001.
- 23 Ibid.
- 24 Baig, S. and U. Iftikhar, 2007, Are the Mangroves for the Future? Empirical evidence of the value of Miani Hor Mangrove Ecosystem as the basis for investments. IUCN The World Conservation Union, Karachi.
- 25 McAllister, D., 1988, Environmental, economic and social costs of coral reef destruction in the Philippines. *Galaxea* 7:161-178; Burke, L., E. Selig and M. Spalding, 2002, Reefs At Risk in Southeast Asia. World Resources Institute, Washington DC.
- 26 Southgate, D. and Macke, R. (1989) 'The downstream benefits of soil conservation in Third World hydroelectric watersheds'. *Land Economics* 65(1).
- 27 From Emerton, L. and E. Muramira, 1999, Economic Assessment of Biodiversity in Uganda. National Environmental Management Authority, Government of Uganda, Kampala.
- 28 OECD 2008, Pro-Poor Growth and Natural Resources: the Economics and Politics. Development Cooperation Directorate, Development Assistance Committee, Organisation for Economic Cooperation and Development, Paris.
- 29 Ibid.
- 30 Emerton, L., 1997, Economic Assessment of Seychelles Biodiversity, Conservation and National Parks Section, Division of Environment, Ministry of Foreign Affairs, Planning and Environment, Republic of Seychelles, Mahé.
- 31 Cohen, S. 2002. Pro-poor Markets for Environmental Services. Carbon Sequestration and Watershed Protection. WSSD.
- 32 Espinosa, C., 2005, Payment for Water-Based Environmental Services: Ecuador's Experiences, Lessons Learned and Ways Forward. IUCN Water, Nature and Economics Technical Paper No. 2, IUCN – The World Conservation Union, Ecosystems and Livelihoods Group Asia, Colombo.
- 33 Reid, W.V., 2001, Capturing the value of ecosystem services to protect biodiversity. In Chichilenisky, G., Daily, G.C., Ehrlich, P., Heal, G., and J.S. Miller (eds) *Managing human-dominated ecosystems*. Missouri Botanical Garden Press, St. Louis.
- 34 Isakson, R. S. 2002, Payments for Environmental Services in the Catskills: A Socio-Economic Analysis of the Agricultural Strategy in New York City's Watershed Management Plan. Report to "Payment for Environmental Services in the Americas" Project, FORD Foundation and Fundación PRISMA, San Salvador.
- 3 World Bank, 2006, Pakistan Strategic Country Environmental Assessment Volume II: Technical Annex. The Cost of Environmental Degradation in Pakistan – An Analysis of Physical and Monetary Losses in Environmental Health and Natural Resources. Report No. 36946-PK, South Asia Environment and Social Development Unit, South Asia Region, The World Bank, Washington DC.
- 36 Turpie, J., Smith, B., Emerton, L. and J. Barnes, 1999, Economic Valuation of the Zambezi Basin Wetlands. IUCN The World Conservation Union Regional Office for Southern Africa, Harare.
- 37 Emerton, L., 1999, La Diversité Biologique de Djibouti: Analyse Economique, Bureau Nationale de la Diversité Biologique, Direction de l'Environnement, Ministère de l'Environnement, du Tourisme et de l'Artisanat, Government of Djibouti.
- 38 Das, S., 2007, Mangroves - A Natural Defense against Cyclones: An investigation from Orissa, India. Policy Brief No 24-07, South Asia Network for Development and Environmental Economics, Kathmandu.
- 39 Burke, L. and J. Maidens, 2004, Reefs At Risk in the Caribbean. World Resources Institute, Washington DC.
- 40 Cavendish, W., 1999. Empirical Regularities in the Poverty-Environment Relationship of African Rural Households. Working Paper Series 99-21. Centre for the Study of African Economies, London.
- 41 Stoian, D., 2003, Making the Best of Two Worlds: Rural and Peri-Urban Livelihood Options Sustained by Non-Timber Forest Products from the Bolivian Amazon. Paper presented at conference on Rural Livelihoods, Forests, and Biodiversity, Bonn.

- 42 Reddy, S. and S. Chakravarty, 1999, Forest Dependence and Income Distribution in a Subsistence Economy: Evidence from India. *World Development* 27(7):1141-1149.
- 43 Kerapeletswe, C. and J. Lovett, 2001, The Role of Common Pool Resources in Economic Welfare of Rural Households. Working paper, University of York.
- 44 Emerton, L., 2005, Making the Economic Links Between Biodiversity and Poverty Reduction: The Case of Lao PDR, IUCN – The World Conservation Union, Ecosystems and Livelihoods Group Asia, Colombo.
- 45 Marshall, E. and A. Newton, 2003, Non-Timber Forest Products in the Community of El Terrero, Sierra de Manantlán Biosphere Reserve, Mexico: Is Their Use Sustainable? *Economic Botany* 57(2): 262-278.
- 46 World Bank, 2006, Where is the Wealth of Nations? Measuring Capital for the 21st Century. The World Bank, Washington DC.
- 47 Steele, P. and S. Feld, 2007, Asia's Smart Growth: Resourceful Strategies for Asia. *Far Eastern Economic Review* April 2007: 53-56.
- 48 From Loth, P. (ed), 2004, The Return of the Water: Restoring the Waza Logone Floodplain in Cameroon. IUCN The World Conservation Union, Gland.
- 49 UNDP-UNEP Poverty and Environment Initiative Mainstreaming Environment for Poverty Reduction and Pro-poor Growth, April 2007.
- 50 WHO, 2002, Addressing the Links between Indoor Air Pollution, Household Energy and Human Health. Report from Washington Consultation, World Health Organisation, Geneva.
- 51 Chandrasiri, C., 2006, Health Impact Of Diesel Vehicle Emissions: The Case Of Colombo City. Research Report No. 2006-RR2, Economy and Environment Program for Southeast Asia (EEPSEA), Singapore.
- 52 Gupta, U., 2006, Valuation of Urban Air Pollution: A Case Study of Kanpur City in India. SANDEE Working Paper No. 17-06, South Asian Network for Development and Environmental Economics (SANDEE), Kathmandu.
- 53 Sarraf, M., Larsen, B. and M. Owaygen, 2004, Cost of Environmental Degradation – The Case of Lebanon and Tunisia. Environment Department Environmental Economics Series Paper No. 97, The World Bank, Washington DC.
- 54 Emerton, L., Iyango, L., Luwum, P., and A. Malinga, 1999, The Economic Value of Nakivubo Urban Wetland, Uganda. IUCN – The World Conservation Union, Eastern Africa Regional Office, Nairobi.
- 55 Olsen, C.S., 2005, Valuation of commercial central Himalayan medicinal plants.. *Ambio* 34(8):607-10.
- 56 Juliard, C., Benjamin, C., Sassanpour, M., Ratovonomenjanahry, A. and P. Ravohitrarivo, 2006, Madagascar Aromatic and Medicinal Plant Value Chain Analysis: Combining the Value Chain Approach and Nature, Health, Wealth and Power Frameworks, microREPORT #70, United States Agency for International Development.
- 57 Guinand, Y. and D. Lemessa, 2001, Wild-food Plants in Ethiopia: Reflections on the role of 'wild-foods' and 'famine-foods' at a time of drought, United Nations Development Programme, UN-Emergencies Unit for Ethiopia, Addis Ababa.
- 58 Clendon, K., 2001, The Role of Forest Food Resources in Village Livelihood Systems: A Study of Three Villages in Salavan Province, Lao PDR. Non-Timber Forest Products Project in Lao PDR, Department of Forestry, Ministry of Agriculture and Forestry and IUCN – The World Conservation Union, Vientiane.
- 59 De Merode, E., Homewood, K. and G. Cowlshaw, 2003, Wild resources and livelihoods of poor households in Democratic Republic of Congo. Wildlife Policy Briefing Paper No. 1, Overseas Development Institute, London.
- 60 Vantomme, P., Göhler, D. And F. N'Deckere-Ziangba, 2004, Contribution of forest insects to food security and forest conservation: The example of caterpillars in Central Africa. Wildlife Policy Briefing Paper No. 3, Overseas Development Institute, London.

- 61 Kasthala, G., Hepelwa, A., Hamiss, H., Kwayu, E., Emerton, L., Springate-Baginski, O., Allen, D., and W. Darwall (2008) An integrated assessment of the biodiversity, livelihood and economic value of wetlands in Mtanza-Msona Village, Tanzania. International Union for Conservation of Nature, Dar es Salaam.

UNEP-UNEP Poverty-Environment Initiative  
P.O. Box 30552 Nairobi 00100 Kenya  
Fax: +254-20-762 4525  
E-mail: [facility.unpei@unep.org](mailto:facility.unpei@unep.org)  
Website: [www.unpei.org](http://www.unpei.org)

