

PART I
Chapter 3

The Economics of Sustainable Natural Resource Management

This chapter highlights the potential contribution of natural resources to incomes, employment, export and fiscal revenues. It provides an overview of policies and investments that can support pro-poor natural resource management and contribute to sustainable pro-poor economic growth.

3.1. Overview

There is a consensus that, over the long term, economic growth is an essential requirement and, frequently, the main contributing factor in reducing income poverty. Evidence across countries and time periods shows that long-term reduction in income poverty results first and foremost from growth. At the same time, developing countries with similar rates of economic growth have experienced quite different levels of economic poverty reduction, due to initial conditions (particularly levels of inequality in incomes and assets) and whether growth occurs in areas and sectors where the poor live and are economically active. The pattern and pace of growth are thus interlinked and need to be addressed together in order to have a substantial and sustained impact on poverty reduction (Box 3.1) (OECD, 2007).

To improve the impact of growth on poverty reduction, the flow of output (or income) from the assets of the poor has to increase and the poor have to increase their asset base, or gain from shifting between assets. Growth that is accompanied by degradation or conversion of natural capital on which the poor depend for their livelihoods (for example, the conversion of open access natural forests into privately-held plantations) may even aggravate poverty.

This chapter provides an overview of how natural resources contribute to sustained pro-poor growth. It focuses on the benefits of sound natural resource management in terms of production, employment creation, export revenues and fiscal resources. It also points to policies and investments which can support pro-poor natural resource management.

Box 3.1. Pro-poor growth

Pro-poor growth focuses attention on the extent to which poor women and men are able to participate in, contribute to and benefit from growth. This is 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.

But when may growth be termed “pro-poor”? There are different views on this issue:

- For some, what matters is whether the incomes of the poor are rising *relative* to the incomes of the non-poor and hence inequality is falling. The merit of this perspective is that it focuses attention on whether the poor are benefiting more or less proportionately from growth and whether inequality, a key determinant of the extent to which future growth reduces poverty, is increasing or falling.
- For others, what matters most is the *absolute* rate at which the incomes of the poor are rising. For example, are they rising fast enough to reduce the number of people living below the international poverty line in accordance with MDG-1?

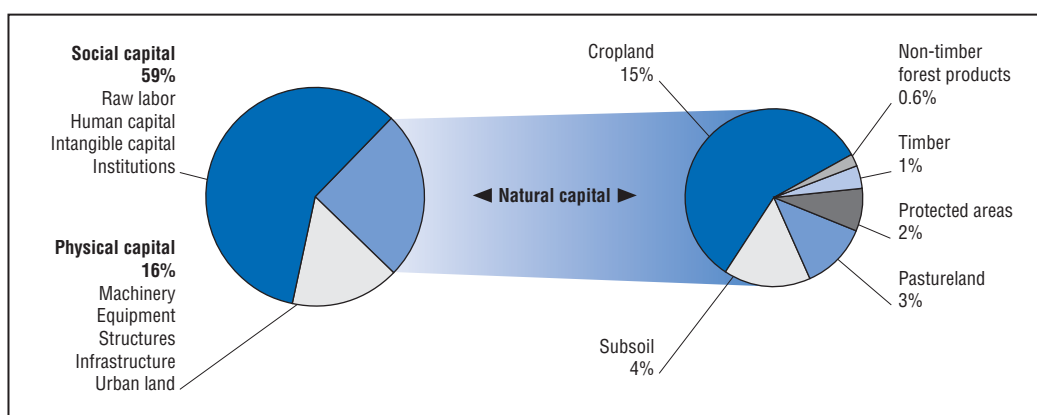
Source: OECD (2007), *Promoting Pro-poor Growth: Policy Guidance for Donors*, DAC Guidelines and Reference Series, OECD, Paris.

3.2. Natural capital contributes directly to incomes, employment and fiscal revenues

Natural resources underpin economic activities in many ways. Extractive resources, such as minerals, timber or fisheries, account for a large share of economic output in many countries. Soil and water resources are also fundamental to agricultural activities, a key part of the economy in many developing countries. Natural resources also act as an environmental host for goods, such as wild fruits, mushrooms, herbs, wild fish caught by small-scale fishermen, “bush meat”, palm, timber and non-timber forest products which contribute to the subsistence of many people.

Natural capital is particularly important in developing countries. It is estimated to account for 26% of the total wealth in low-income countries (Figure 3.1), 13% of wealth in middle-income countries and only 2% of wealth in industrialised or OECD countries (World Bank, 2006b). Moreover, primary production represents a much higher share of production, exports and national income in developing countries compared with its share in industrialised countries. Natural resource-based enterprises thus provide important employment and income opportunities.

Figure 3.1. **Composition of total wealth in low-income countries**



Source: World Bank (2006b).

Forestry provides more than 10% of the GDP 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 (Dubois, n.d.; ILO, n.d). In several developing countries, forests provided annual export revenues of over USD 100 million and more than 10% to 20% of export earnings (Lebedys, 2004). A quarter of the world’s poor and over 90% of the people living in extreme poverty depend on forests for some part of their livelihoods.

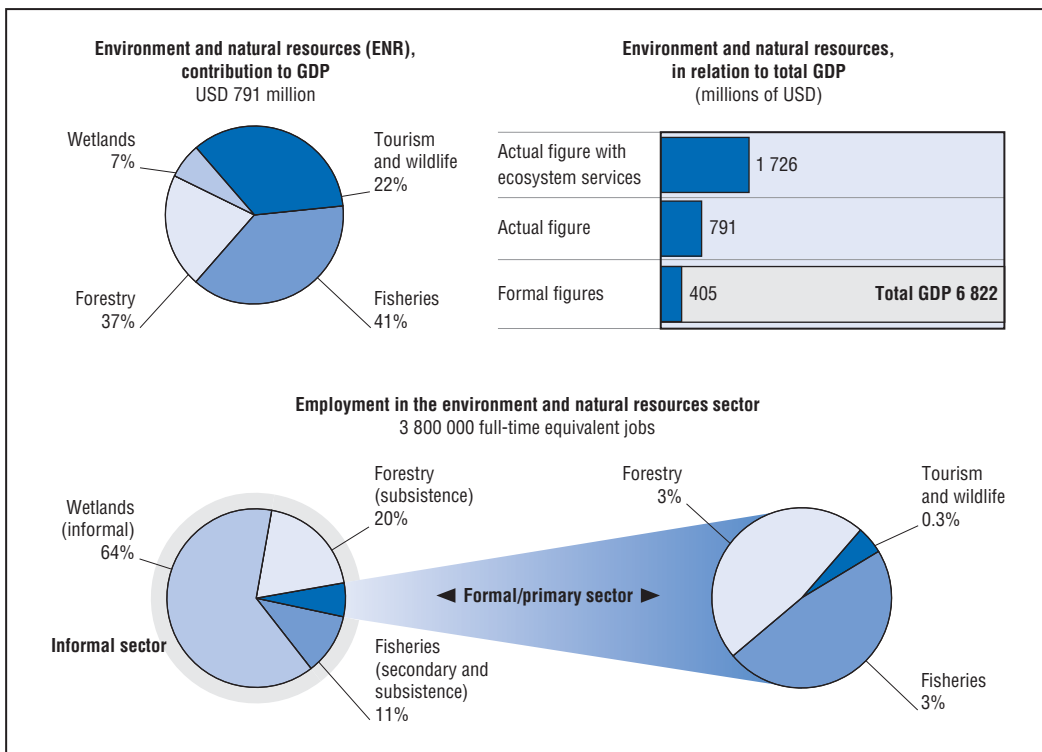
Fisheries account for between 10% and 30% of government budgets in several West African countries. Between 1993 and 1999 fishery access agreements provided 30% of the government revenue in Guinea Bissau, 15% in Mauritania, and 13% in Sao Tome. At the local level, in some areas fishery taxes provide a significant source of local revenue. Seafood exports from Africa into the European Union are worth over USD 1.75 billion and constitute the largest agricultural export product. For African least developed countries (LDCs), the seafood

trade was worth USD 570 million and, again, was the largest agricultural export product (FAO, 2007b; OECD, 2005).

Wildlife and nature-based tourism contributes significantly to the life of many poor people. An estimated 150 million people (one-eighth of the world's poorest) perceive wildlife to be an important livelihood asset. Nature-based tourism has high potential for pro-poor growth, being one of the fastest growing segments of the global tourist industry. Trophy-hunting generates significant incomes and public revenues in countries of eastern and southern Africa.

Figure 3.2 outlines the importance of natural resources in Uganda.

Figure 3.2. **Uganda: Quantifying the importance of environment and natural resources**



Note: It is estimated that the environment and natural resources sector should contribute USD 791 million to Uganda's GDP, excluding benefits such as ecosystem services. In the formal figures, where subsistence use and informal markets are not captured, only USD 405 million are recorded. Over 90% of the employment in the sector is secondary processing and subsistence use. Sustainable natural resource use implies that this sector will continue to provide vital non-agricultural rural employment for the poor. Conversely, unsustainable use will eliminate jobs from this sector.

Source: Moweni and Yaron (2004).

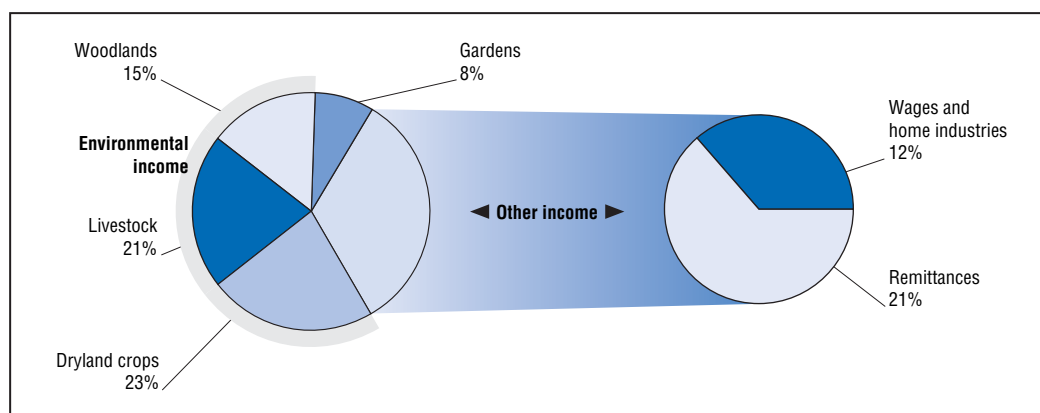
3.3. Natural resources underpin the livelihoods of many among the poorest

The poor are often highly dependent for their livelihoods on “common property” natural resources, which include fallow fields, forests, fishing grounds, pastureland and wetlands. These are a source of a variety of goods including food, fodder, building materials, fuel and medicinal plants among others, which are important sources of sustenance or income for many landless poor. In India, it has been estimated that common property resources provide poor households with about 12% of their income. In general the poorer the household, the more important is the income contribution through common

property resources. As a result, common property natural resources contribute to rural equity (Beck and Nesmith, 2001).

Some of the goods provided by natural resources are traded in formal markets and accounted for in national economic statistics. They include, for example, timber and fish harvested by formal-sector operators. But many are consumed directly by local inhabitants or are traded informally and/or illegally to avoid taxes and other regulations. As a result, they do not figure in official statistics. Figure 3.3 shows this in the case of Zimbabwe.

Figure 3.3. Household income by source, Masvingo province, Zimbabwe



Source: WRI (2005).

The forestry sector provides an example of the large share of informal activities and values which are not recorded in national accounts (Box 3.2).

Box 3.2. Some examples of accounting for informal forestry activities in national income accounts

In recent years, a number of countries have attempted to measure informal or non-monetary activities in their national income accounts. The following text presents some information from official reports, followed by comments on these figures (shown in *italics*) by Lebedys (2004). As the text shows, there is considerable variation in the way that informal forestry sector activities are handled in national income accounts.

Uganda: According to the government of Uganda, official statistics indicate that the forestry sector accounts for about 1.5% of GDP. For example, in 1999, the Ugandan Bureau of Statistics estimated that value added in forestry amounted to UGX 126 billion (Ugandan shillings), with UGX 64 billion generated in the formal sector and the remaining UGX 62 billion in the informal sector. In total, the sector accounted for about 1.5% of GDP.

A more recent review of the economic importance of the forestry sector in Uganda was produced as an unofficial report by the forestry administration. This estimated that more than 70% of wood consumption in Uganda is in the informal sector, which alone is valued at about 2.75% of GDP. Including the informal sector and a modest estimate of the value of environmental services provided by forests, the forestry sector accounts for about 6% of GDP. Major contributors to this are: domestic fuel wood – UGX 120 billion; charcoal production – UGX 70 billion; non-wood forest products – UGX 66 billion; commercial fuel wood – UGX 43 billion; and sawn timber – UGX 40 billion.

Box 3.2. Some examples of accounting for informal forestry activities in national income accounts (cont.)

Current estimates of fuel wood production in Uganda are 33 million cubic metres (m^3) of fuel wood plus 0.7 million MT (metric tonnes) of charcoal (FAO, 2003). The exchange rate (in 2000) was UGX 1 512 to USD 1.00. Based on this information, the unofficial figures above would suggest that value added in fuel wood production is about USD 3.30 per m^3 (i.e. UGX 163 billion/33 million CUM = UGX 4 939 per m^3 , or USD 3.30 per m^3). The value added per MT of charcoal production would amount to USD 66 per MT (i.e. UGX 70 billion/0.7 million MT = UGX 100 000 per MT or USD 66 per MT). These figures appear quite plausible, suggesting that the unofficial report may give a better indication of the importance of the sector than the official statistics in the national income accounts.

Tanzania: In 2000, the official statistics for value added in forestry and hunting show a total of TZS 209 billion (Tanzanian shillings), with TZS 76 billion in the formal (monetary) sector and TZS 133 billion in the informal (non-monetary) sector. Together, these two sectors accounted for 3.1% of GDP (Bank of Tanzania).

The current estimate of fuel wood production in Tanzania is 21 million m^3 (FAO, 2003), the exchange rate in 2000 was TZS 800 per USD 1.00 and average fuel wood prices are about TZS 3 000 per m^3 . These figures would suggest that the gross value of fuel wood production in 2000 was TZS 63 billion (i.e. 21 million m^3 x TZS 3 000 per m^3). Alternatively, taking the value-added figure for Uganda (USD 3.30 per m^3), value added in fuel wood production in Tanzania might amount to about TZS 55 billion (i.e. USD 3.30 per m^3 x TZS 800 per USD x 21 million m^3). Considering that fuel wood production might only account for about half of informal forestry activities and that hunting is also included in the official figures presented above, it appears that the official figures may be quite reasonable estimates.

Philippines: The official estimate of gross value added in forestry and logging activities in 2000 is PHP 3.4 billion (Philippine pesos), amounting to 0.1% of GDP.

Based on an exchange rate of PHP 44 per USD 1.00 in 2000, the figure above is equal to USD 77 million or USD 25 per m^3 of industrial roundwood production or USD 2 00 per m^3 of total roundwood production (FAO, 2003). However, according to REAP (2002), average fuel wood prices in the Philippines in 2000 were PHP 1.5 to PHP 2.2 per kg (equal to about USD 24 to USD 36 per m^3). Assuming that gross value added in fuel wood production is fairly close to the gross value of output (i.e. USD 24 to USD 36 per m^3) the gross value added from fuel wood production in the Philippines would be close to USD 1.2 billion (i.e. USD 30 per m^3 x 40 million m^3) or an additional 1.5% of the country's GDP. Even if a significant allowance were made for transport costs, this would suggest that the value added in the informal fuel wood production sector is substantially higher than the official estimate of value added in the sector.

Source: Lebedys, A. (2004).

3.4. Natural resources provide a safety net in times of crisis

Natural resources provide vital supplementary income or food in times of crisis such as drought, in periods when employment opportunities are scarce, or when food stocks are low before the harvest. A study of the Mt. Elgon National Park in Uganda shows that environmental resources have played a safety net function during periods of natural and social disaster. Environmental income constitutes 19% of total revenue for peasants living near the park and poor households depend more on environmental incomes than wealthier households (OECD, 2006c).

3.5. Natural resources generate a wide range of positive externalities at the national and global levels

- *Local or national-level natural services* include, for example, the soil stability provided by upstream vegetation in a watershed, which contributes to the good functioning of downstream water supply, irrigation or hydro-electric facilities. Other examples include the pollination services provided by bees and other insects and recreation services provided by natural parks or reserves which underpin the nature-based tourism industry. Whether or not they are marketed and counted in GDP statistics, these services contribute to production, consumption and welfare. In some cases, they play a critical role in sustaining economic growth. Africa's dependence on hydro-electricity, which in turn depends on reliable water supplies, illustrates this (Box 3.3).

Box 3.3. Importance of watersheds for urban electricity in Africa

Urban electricity is crucial for industrial development and growing urbanisation. What is less known is that much of Africa's urban electricity is heavily dependent on water for hydro-electric power generation. For 26 sub-Saharan countries, hydro-electricity is the main power source, and for a further 13 countries is the second most important power source (Showers, 2002).

However, many of these economies are vulnerable to drought. When river flows are reduced, generating hydro-electricity becomes more difficult and the electricity supply, insecure. For example, Dar as Salaam, Tanzania's most economically important city, suffered frequently from power outages because of the drought in 2006. This has also been the case in Egypt, Cameroon, Ghana, Namibia, Nigeria, Zambia and other countries.

- *Global level externalities* include, in particular, genetic information for biotechnology from biodiversity and the sequestration of CO₂ by forests, which helps contain climate change. These are two clear examples which benefit all countries but not necessarily the nation hosting the forest. Extensive literature exists on the economic impact and costs of climate change and adaptation and the topic is therefore not covered here (but see Box 1.1 above on the negative impacts of climate change).
- *Natural resource extraction can also generate negative externalities.* The degradation of natural services undermines human welfare and often necessitates costly remedial actions. Many extractive activities, such as mining or commercial-scale logging, generate a host of negative externalities which must be mitigated. The impact of these external costs, in the form of harmful water and air pollution and of soil erosion, often falls disproportionately on the poorest.

3.6. Sustainable natural resource management raises unique challenges

3.6.1. Minimising the impact of “boom and bust” cycles¹

As noted in Chapter 2, countries which are heavily reliant on natural resources are vulnerable to “boom and bust” cycles. This problem can be addressed through various policies.

The creation of a stabilisation fund is one important policy response. It typically aims to reduce the impact of volatile revenue on the government and the economy, to save for

future generations, or both. It accumulates windfall government revenues which would ideally be managed by an entity that has no authority to spend the money (that is, an independent special institution or the central bank, but not the government, the ministry of finance, or any other ministry). The rules for when, and which, revenues should be accumulated and when they may be spent should be very strict and transparent. The accumulated revenues should primarily be invested in safe and liquid foreign currency-denominated assets, if domestic financial markets are very thin. But consideration should also be given to investing part of these resources in selected domestic assets, as these resources can support the strengthening and deepening of local financial markets. However, this approach implies that any increase in natural resource price and associated revenues would not contribute to pro-poor growth in the short term, if revenues are saved for the future. Their use is limited to preventing a slowdown or loss of pro-poor growth in later periods when prices are lower.

An alternative policy option is the use of windfall revenues to fund public investments (e.g. in infrastructure) that raise the productivity of private investment, not only in non-traded sectors but also in traded sectors. Over time this can reduce the dependency on natural resources and contribute to pro-poor growth often faster than stabilisation funds.

A counter-cyclical fiscal policy with respect to commodity prices is another possible policy response. It requires keeping the budget on a sustainable fiscal path across the commodity price cycle while avoiding fluctuations in pro-poor spending. Moreover, fiscal policy should always be based on conservative price assumptions for the major export commodities. If budgetary commodity price assumptions are above long-term averages, or if revenue assumptions implicitly take above-average prices for granted, then budgets should be drafted to achieve corresponding surpluses. In this respect it must be clear that a budget that balances thanks only to exceptionally high commodity prices is not in balance at all.

Export diversification is another way to minimise the impact of “boom and bust” cycles, but is a rather long-term process. Initiatives such as commodity risk management instruments and specific programmes for fostering the development of new export sectors can help governments to withstand external shocks and sustain their diversification strategies.

Keeping external debt (whether public or private) at a sustainable level also helps in reducing external vulnerability, both by decreasing the risk of currency crises and by limiting the damage from such crises if they do occur. Resource-based economies also need a significant degree of exchange-rate flexibility in order to be able to accommodate shifts in their terms of trade. When commodity prices are rising, the problem is that currencies may become fundamentally overvalued, bringing the risk of especially large and painful exchange-rate depreciations as and when those prices fall. Hence there may be a place for efforts to avoid excessive exchange-rate appreciation, especially when the prices of major export commodities are high and there are large short-term capital inflows. Nonetheless, pursuing such exchange-rate goals may be costly in terms of inflation unless there is the political will for sufficient fiscal sterilisation. This reinforces the need for resource-based economies to have a stabilisation fund, but it also implies that their central banks need an especially large capacity for monetary sterilisation.

3.6.2. Avoiding the “Dutch disease”¹

The potential negative impact of the natural resource sector on the economy (the Dutch disease referred to in Chapter 2) can be mitigated by the right policies. Specific public investments funded by windfall revenues, export diversification and the tax system can all be instrumental in avoiding Dutch disease and in assisting the development of the non-resource sector. If the tax system is used for impact mitigation, direct taxation of the natural resource sector should be increased, though it must be assured that these sectors, which are often critical to growth, remain sufficiently profitable to allow for their further development. The proceeds of the increased resource taxes should then be used to lower overall tax levels in the economy and, in particular, to cut non-wage labour costs. While lower non-wage costs might be – in certain sectors – wholly or partially offset by wage increases, they should at least lead to lower total labour costs in sectors with low productivity.

While orienting the tax system towards the resource sector can help to alleviate Dutch disease, it also increases the dependence of the budget on commodity prices. This underlines the importance of having a sufficiently large stabilisation fund and/or complementing this policy with measures that help generate alternative public revenues, such as selected public investments that contribute to increase the productivity of the national economy.

3.6.3. Getting prices right

Clearly defined access rights may limit the overuse and degradation of renewable natural resources and allow for better resource use. Taxes and user fees may also be used to improve resource management, but often other instruments are needed such as zoning, permits or labelling systems. These instruments are specific to the natural resource sector concerned and are discussed in Chapters 6 to 12.

3.6.4. Tackling the “absent market” challenge: Payments for environmental services

Some of the intangible environmental services provided by natural resources can be paid for through specially-designed market mechanisms. For example, admission fees to parks – national or private – could cover the costs of maintaining them. In many countries, for example, bee-keepers are compensated by fruit growers. Other services such as water filtration or the regulation of water cycles are much more difficult to measure, and to charge for. The beneficiaries of such services are also many, diverse and difficult to identify. Charging for such services requires mechanisms which are difficult to establish.

“Payment for environmental services” (PES) schemes have generated considerable interest in recent years. PES are used to finance conservation, watershed protection (Box 3.4) or carbon sequestration (Landell-Mills and Porras, 2002; Pagiola, Bishop and Landell-Mills, 2002). They may contribute to reducing poverty mainly by making payments to poor natural resource managers. However, the evidence on the pro-poor nature of PES schemes is still limited. It is in many cases too early to arrive at conclusive results on the likely results of PES programmes (Pagiola, Arcenas and Platais, 2005). This issue is therefore not covered further here.

Box 3.4. Payment for watershed preservation services

In Colombia, self-organised private deals and public payment schemes are being used to improve forest management, reforestation activities and development of watershed communities.

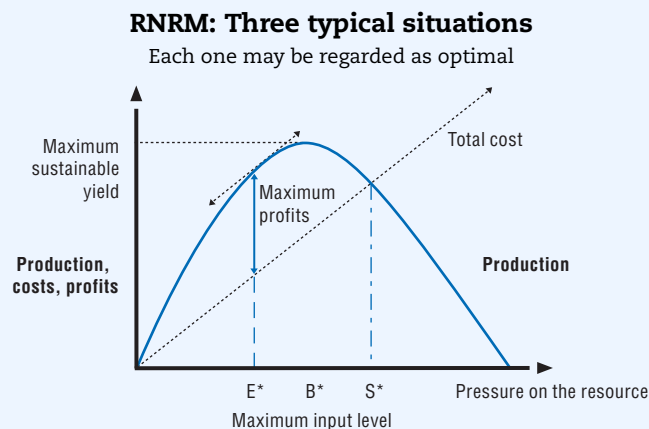
In Costa Rica, private upstream owners of forestland are being compensated by private hydro-electric utilities, the government of Costa Rica and a local NGO. New York City has set up an elaborate watershed management scheme which includes compensating upstream private landowners for adopting watershed-friendly land uses, in addition to regulatory measures and the purchase of particularly ecologically sensitive land. In all such schemes, assessing the level of the payments to be made and verifying compliance are key challenges.

3.6.5. Selecting from a range of possible sustainable exploitation equilibria

In the case of renewable resources, a key challenge is to ensure that extraction rates do not exceed the capacity for regeneration, in other words to ensure sustainable exploitation. In many cases, however, there are multiple sustainable equilibrium rates of extraction. There will often be a trade-off between the objective of maximising the economic value of resource extraction and those of maximising other benefits such as associated employment opportunities or (in the case of fisheries) maximising food production (Box 3.5). For a discussion of the distributional implications of these policy choices, see section 4.2.2.

Box 3.5. Political priorities on the management of natural resources determine the optimal rate of exploitation

This figure depicts the trade-offs between three typical situations of renewable natural resource management (RNRM): i) the maximization of financial rents (economic optimum: E^*); ii) the maximisation of production (biological optimum B^* , or maximum sustainable yield MSY) that can be preferred if the priority consists in food security or in exports (for example); and iii) a situation of weak profits but with maximal number of resource harvesters (S^*) which can be preferred if the priority relates to employment (for example). Hence, depending on the political priorities, each situation can be regarded as optimal.



Source: Wertz-Kanounnikoff and Rojat (2007).

3.7. Converting natural resources into other forms of capital: Some key issues

3.7.1. There is often scope for converting natural resources into other forms of capital

Liquidating natural capital (*e.g.* by exploiting a fishing ground to exhaustion) and consuming the proceeds clearly reduces the total amount of capital available to an economy and is not profitable over the long term.

However, there is generally scope for converting one form of capital into another. Converting natural capital into human and man-made capital can be a way to increase the total output if this conversion is towards more productive forms of capital. “Wild” natural capital can be substituted with “produced” natural capital, for example when a forest is converted into a tree plantation, pastureland or agricultural land or a mangrove is converted into a fishpond. Similarly proceeds from the extraction of resources such as minerals – which are non-renewable anyway – can be used to finance investments in, for example, infrastructure, education or health.

3.7.2. But certain conditions must be met

For conversion of natural capital into other forms to be economically beneficial in the long term, certain conditions must be met. One approach, known as “weak sustainability”,² requires that the combined value of all forms of capital should remain constant or on the increase. A growth path which obeys this principle when the stock of natural resources is reduced is often said to follow “Hartwick’s rule” (Box 3.6). It requires that a nation invests all rents earned from exhaustible resource extraction. This has been the process followed in many industrialised countries, and in a number of middle-income countries such as Indonesia and Malaysia.

Box 3.6. Hartwick’s rule and Hotelling’s rule

In resource economics, **Hartwick’s rule** defines, under certain conditions, the amount of investment in produced capital (buildings, roads, knowledge stocks, etc.) that is needed to exactly offset declining stocks of non-renewable resources. This investment is undertaken so that the standards of living do not fall as society moves into the indefinite future. Hartwick’s rule – often abbreviated as “invest resource rents” – requires that a nation invest all rent earned from exhaustible resource extraction, where rent is defined in a particular way. The rule extends to the case of many types of capital goods, including a vector of stocks of natural capital. Hartwick’s rule is a special case of **Hotelling’s rule**, which defines the optimal profile of resource extraction given an exogenous rate of time preference (*i.e.* a marginal rate of intertemporal substitution); intertemporal equilibrium ensures an efficient substitution between exhaustible resource stock and investment in produced capital.

The “genuine saving” approach provides a way to estimate how countries are managing to maintain or increase their total stock of capital (Box 3.7).

3.7.3. The decision to convert natural capital must take account of a wide range of factors

For the conversion of natural capital into other forms to be beneficial overall, the present value of the flow of goods and services provided by the capital to be converted must be less than that yielded by the alternative form of capital. The factors to consider when assessing the likely merit of converting natural capital into another type of capital vary with different types of resources.

In the case of *metals, minerals and fossil fuels*, which are non-renewable and exhaustible, the main issues to consider are i) the optimal rate of exploitation, which will be guided by the open *Hotelling rule* (Box 3.6); ii) the appropriate share of the proceeds to be invested in human, financial or physical capital in order to keep total capital levels growing or constant; and iii) how to mitigate or compensate for the negative externalities such as pollution which are generated in the course of extraction.

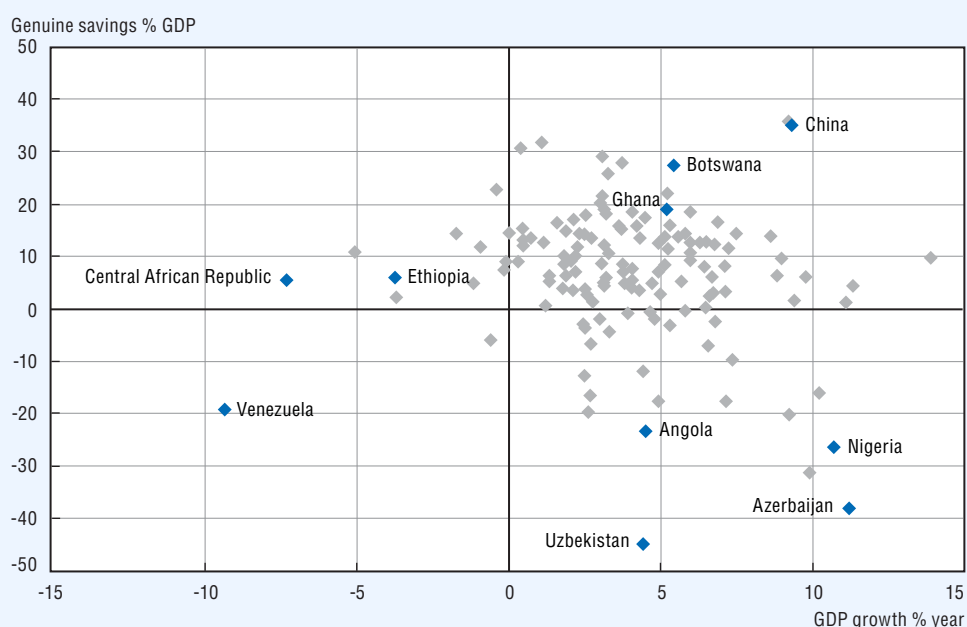
Box 3.7. Genuine net saving: An indicator to assess overall capital stock

One way to assess (*ex post*) whether the conversion of natural resources into other forms of capital has kept constant or increased the overall capital stock is to look at “genuine saving”. Genuine (or adjusted net) saving measures the true level of saving in a country after depreciation of produced capital. Investments in human capital (as measured by education expenditures); depletion of minerals, energy, and forests; and damage from local and global air pollutants are taken into account. It does not, however, take into account fish stocks depletion and subsoil water, because of a lack of data. Positive genuine saving implies that wealth from all forms of capital is increasing. Negative genuine savings indicate that total wealth is in decline.

The figure below scatters genuine saving rates (as percentage of GDP) against GDP growth. Countries in the top right quadrant have positive GDP growth rates and genuine saving rates. These countries’ economies are growing and, according to the genuine saving measure, not at the expense of future generations. This points to a positive future for countries like China, Ghana and Botswana, all of which have strong economic growth and positive genuine saving rates, although a more complete measure taking into account pollution damage and soil degradation would show a more muted performance.

Countries in the top left-hand quadrant are experiencing contracting economies with declining GDP. Lower levels of economic growth today imply falling living standards. However, these countries have positive genuine saving rates, implying they are investing for the future. The forecast for a sustainable economy is, therefore, a possibility.

A preliminary glance at the traditional indicators of economic growth suggests that those countries in the bottom right-hand corner of the figure below are doing well, as economic growth is positive and their economies are growing. However, when the genuine savings calculation is considered, this optimistic picture needs more consideration. Countries such as Nigeria, Angola, Uzbekistan and Azerbaijan all have growing economies, but possibly at the expense of future generations’ welfare, as their genuine saving rates are negative. This highlights the importance of considering other indicators in addition to economic growth to forecast the sustainable growth of a country.

Box 3.7. **Genuine net saving: An indicator to assess overall capital stock** (cont.)**Genuine savings rates against economic growth (2003 data)**

Source: World Bank (2006b).

In the case of renewable resources, such as fisheries and many types of forests, where there is scope for continued exploitation at economically profitable levels, a decision to deplete and eventually liquidate the stock completely must be based on a careful calculation of all the associated costs and benefits. In addition to the opportunity cost of continued sustainable extraction, this calculation must factor in the wide range of environmental services provided by natural systems.

In such cases the decision whether to convert natural capital into other forms must be based on a comprehensive assessment of the balance of benefits and costs. This will entail estimating the value of non-market goods and services for which there will not be readily observable prices. The Millennium Ecosystem Assessment, which has examined these issues in depth, has stressed the costs of this conversion process in terms of the forgone ecosystem benefits, and noted that many ecosystem conversions have failed to provide the hoped-for benefits.

3.7.4. *There can be difficult trade-offs between different interest groups*

There will often be differing perceptions of trade-offs at the regional, national level and local levels. For example, a forest may provide essential services to a region in terms of watershed protection whereas local inhabitants would earn more by converting it to, say, agriculture. Conversely, the conversion of a natural forest into a plantation may generate economic benefits and jobs but undermine the livelihoods of local communities. A detailed distributional analysis is needed to ensure that the poor are not left worse off after conversion than before, even when others gain. Similarly, large-scale biofuel development raises concerns over rising food prices, deforestation and competition over land. Such

trade-offs can only be resolved through national and local-level political processes and backed by reliable information.³

3.7.5. Critical thresholds can be reached

There are limits to the degree to which natural capital can be substituted by produced assets such as physical and human capital. Beyond a certain point, the maintenance of remaining natural capital becomes critical. This happens when the life-supporting ecosystem services provided by natural capital are irreplaceable or can only be replaced at very high cost. Services such as water filtration, regulation of water cycles or the provision of habitats for spawning could in principle be provided artificially (by physical or biochemical processes) but are provided much more cheaply by natural ecosystems. In many such cases, the value of alternate land use is actually low or zero.

For example, a forest in steeply-sloping terrain is likely to be the optimal use of this particular piece of land, given that it cannot readily be converted to agriculture. In economic terms, the opportunity cost of maintaining critical capital is low or negative. Given the right set of regulations, access rights regimes and incentives, it may be possible to combine production of the goods provided by the forest (e.g. timber extracted in a sustainable way) as well as non-marketed services such as watershed protection. Conversely, exploiting this forest to exhaustion would entail its irreversible loss, with few, if any, compensating benefits.

This has given rise to the concept of “critical natural capital” beyond which there should be no further substitution. Some countries have discovered this the hard way and are having to devote significant resources to restoring critical natural capital at a cost much higher than preventing its degradation.

3.7.6. In some cases, natural capital may become an indispensable complement to existing human and other capital, not a substitute⁴

The scope for converting natural capital into other forms of capital may in some cases be minimal or zero where existing human capital is very specifically linked to available natural capital. Subsistence farmers, for example, may have very specialised knowledge and skills which are only applicable to their current activity. Where natural capital is so severely degraded that it can no longer be used, considerable human capital is lost as well.

For example, if farmers abandon agricultural production as a result of collapsing soil fertility and start working as unskilled labour in a non-agricultural sector, both the natural capital and the associated human capital (specialised knowledge and skills related to their farming background) are lost.

In such cases, preventing the collapse of remaining natural capital through appropriate measures and investments yields high economic returns, as it preserves both natural and associated human capital.

3.7.7. Conversion of natural capital often results from neglect rather than rational decision making

In practice many natural resources are exhausted or converted to inferior uses not as a result of a rational decisions based on a careful assessment of potential benefits and costs but as the consequence of a set of policy, regulatory and enforcement failures which lead to the uncontrolled exploitation and irreversible exhaustion of natural capital.

This is clearly not economically or socially desirable. Moreover, many opportunities for investments which could foster economically profitable management in sectors such as

fishery and forestry are missed. These issues are further addressed below and in the sections on forestry and fisheries.

3.8. Natural resource management in support of pro-poor growth: Key approaches

3.8.1. Protecting and expanding the natural capital available to the poor

Protecting and expanding the natural resources which are of particular importance to the poor is therefore an important way to support pro-poor growth. A first step is to ensure that open access to natural resources on which the poor depend is not *de facto* privatised by elite groups. Such unwanted privatisation may occur in particular when traditional systems of regulation on common property use that worked in the past have broken down – partly due to population pressure as well as to other factors. It can also happen when public resources (for example forests) are leased out to commercial-scale operators under concession agreements which grant exclusive access, driving out the poor. The problem of state capture by the elite through corruption and political patronage is more prevalent in remote areas, far from official concern and public scrutiny, which are precisely those areas inhabited by the poor.

Box 3.8. Natural resources and the poor in India and Uganda

Loss of forest access among the poorest in India: Can it be prevented?

In western and southern India, privatisation of land has created a reduction of up to 25% or 50% in the area of common property resource lands. The national forest policy of 1998 recognises this: “The life of tribals and the other poor living within or near forests, revolves around forests. The rights and concessions enjoyed by them should be fully protected. Their domestic requirements for fuel wood, fodder, minor forest products and construction timber should be the first priority. Similar consideration should be given to scheduled castes and other poor living near the forests.” However, implementation of this policy is fraught with difficulties.

In Uganda, access to natural resources is a key determinant of incomes

For rural households in Uganda, the key variable explaining income levels was access to land and livestock. In villages near Lake Victoria, the key variable explaining income was access to fishing boats and gear. These have been found to be more important in determining income than other variables such as access to education. Success in one activity enables success in another, and so fishing income may be used for land and livestock investments.

Source: Ellis and Bahiigwa (2003), Jodha (1990).

Addressing these issues may require reforming existing access or use rights, strengthening enforcement or both. Changes in the fiscal treatment of property, for example by penalising owners who keep land idle, can also help increase the natural capital available to the poor and ensure that all available land is put to use.

There will be difficult trade-offs to resolve where communities or small and medium-sized enterprises compete for the same resources with more efficient large-scale enterprises. In such situations, a balance will have to be struck between the objective of maximising the total value of production and that of creating job opportunities for the poor. The fisheries sector provides a clear example of such a trade-off: export-oriented

large-scale fishing boats are more efficient and generate more economic value than their self-employed, small-scale counterparts, but also much less labour-intensive. Similarly, commercial-scale forest extraction is often more efficient in terms of maximising economic value than community-level extraction.

3.8.2. Maximise the productivity of existing natural capital through complementary public investments

Most types of natural capital require complementary investments to generate growth effectively. Many such investments are unlikely to be financed by the private sector and require public support. Examples include physical infrastructure such as irrigation facilities which can sharply increase agricultural productivity, and transport infrastructure, which can provide access to markets and inputs. Similarly, the provision of training and extension can foster efficient land or water management, the uptake of new technologies and crops, etc. Improved access to credit is an important complement.

In many cases, improved access to market and credit is necessary for farmers to switch from low-productivity subsistence food crops (*e.g.* rain-fed corn), to higher value tree crops (fruit crops, cashew nuts and similar), which are far more desirable from both economic and environmental perspectives.

In the case of fisheries, improved landing facilities and access to refrigeration and transport can sharply increase market value of the fish catch. In the case of agricultural products, access to processing facilities (*e.g.* storage, drying) reduces post-harvest loss and increases the price obtained for the products. Nature-based tourism may require advertising campaigns in target markets at a cost far beyond the reach of individual operators while benefiting the entire tourism sector of a country. Improved access to modern energy can often facilitate value-adding processing industries based on natural resources (*e.g.* handicrafts, furniture and so on).

In many cases modest but strategically selected public investments which greatly increase the productivity of natural resources yield high rates of return.⁵ Targeting such investments at particularly poor areas or at activities of particular importance to the poorest will support pro-poor outcomes. There may, however, be trade-offs. Achieving a proper balance between the most profitable investments and those with the most pro-poor benefits will require a political decision.

3.8.3. Ensure that access and use rights and regulations result in proper pricing of resources

The efficiency of using natural resources is heavily influenced by regulations regarding rights of access and use. Different types of resources call for different types of regimes. A general rule, however, concerns the need to avoid “open access” situations by attributing clear access and use rights at the right level. These range from community-level rights to private property rights. Established rights must also be enforced. These issues are discussed in more detail in sector-specific chapters below.

The pricing of access or use rights to the resource is another important policy instrument affecting efficiency of production. When water prices do not reflect the actual cost of provision, farmers use far more than they need for a given harvest, water-intensive crops are grown in water-short regions, and irrigation works are not kept in good working order.

Subsidisation of resource extraction generally promotes wasteful use. By artificially depressing the prices of natural resources, subsidies remove the incentive for efficient use of

resources by industries that process the resources or use them as an input, or by consumers. Subsidies are often indirect. In the case of forestry, for example, log export bans or support for investment in processing capacity (in the name of stimulating value-adding processing) can act as *de facto* subsidies for domestic wood industries, even if timber extraction itself is not subsidised. Economic analysis and case studies of Malaysia, Ghana and Indonesia suggest that the main effect of logging bans has been to encourage overcapacity and maintain inefficiency in the wood-processing industry, both of which increase the pressure on forests (Porter, 2002). (See Chapter 7 for more detailed coverage of these issues.)

Other critical factors include, in particular in the case of renewable resources, regulations regarding harvesting techniques and equipment. The objective is to minimise damage to the resource in the course of harvesting.

In the forestry sector, that implies ensuring that harvesting does not destroy immature trees which can then be harvested in subsequent rounds. Support for the application of “reduced impact logging” techniques is particularly relevant in this regard. For fisheries, the aims include avoiding techniques which lead to high rates of by-catch or catches of undersized fish. Some forms of industrial-scale fishing lead to high rates of wastage. Up to 80% of the fish catch is discarded because it is commercially useless and was not the intended target of the fishing nets. Such catch methods may be privately profitable, but socially inefficient, as individual fish catchers do not have incentives to care about fish stock regrowth (which benefits all users).

In some countries, even subsistence-scale natural extraction activities (e.g. timber extraction, fishing and marketing, grazing, agriculture and water use) are heavily taxed and regulated. For example, taxes on subsistence fish extraction, production and distribution are levied in many countries. Around Lake Chad in central Africa, fishery fees are levied by traditional authorities, the central government and by soldiers (Béné, 2003; Béné and Neiland, 2003). Streamlining fiscal and regulatory regimes will directly increase the benefits to the poor, notably by allowing them to engage in formal marketing activities and improve the returns from their convenient access to natural resources. It must be noted, however, that natural resource taxation is also often informal (i.e. bribes) and may be equivalent to rent capture by local officials for private gain.

3.8.4. Maximise the commercial value of the resource extracted by raising product quality

Improved transport, communications and financial services can improve access to markets. Beyond this, there are many other ways to increase the commercial value of natural resource-based products. Provided access and use rights are well defined and enforced, this can help sustain the resource base by increasing revenues from resource extraction and raising the opportunity cost of their degradation.

Relatively simple processing activities, such as fruit-drying or improved product standardisation and packaging, can greatly increase product value and expand the range of marketing opportunities, notably in export markets.

Securing access to export markets often requires an ability to meet rigorous standards and requirements, such as health, sanitary and safety standards for fish, fruit and other products. Investment in the human and technical capacity to meet such standards can pay off through higher prices. Focusing such efforts on the products which can be produced by the poor (i.e. which can be produced by small-scale operators with limited equipment

Box 3.9. Rising shrimp prices in Madagascar

The shrimp industry – both wild and farmed – is an important industry in Madagascar, earning over USD 155 million a year in export revenues. Recent efforts by the private sector and the government to improve the industry have led to significantly rising prices. Export prices increased by 10% over 2000/1 and 3% over 2001/2. This price rise occurred as the result of a larger shrimp size obtained by controls on overfishing, and improved access to market and other information through an economic observatory.

Source: Rojat, Rojaosafara and Chaboud (2004).

requirements and limited know-how) enhances income opportunities for the poor. Relevant products may include natural food products (e.g. dried fish, honey) as well as handicrafts (wood products and basketry).

Voluntary product standards associated with “eco-labels” or “fair-trade” labels are also increasingly important. The growing sale of, for example, fair trade coffee, Forest Stewardship Council wood products and Marine Stewardship Council fishery products, as well as of products certified as “organic” (which include foods, cotton and others), indicates a growing consumer demand for products which meet social and environmental standards. Initially confined to “niche” markets, these products are increasingly mainstreamed and distributed in supermarkets.

Box 3.10. Growing demand for “fair trade” and environmentally certified products

The “FAIRTRADE” mark is a certification label awarded to products sourced from developing countries that meet internationally recognised standards of “fair trade”. By participating in fair trade, producers are able to use the additional income to strengthen their organisations and invest in social, environmental and business improvements.

In 2006, consumers worldwide bought Fairtrade Certified Products worth more than EUR 1.6 billion, 42% more than the year before. For products such as coffee and cocoa, the growth was particularly impressive, 53% and 93% respectively (FLO 2007). There are now over 2 500 certified Fairtrade product lines available, according to the Fairtrade Foundation (2006).

Larger companies are embracing fair trade. To quote Marks and Spencer: *We know from our own research that shoppers want to be able to buy more fair trade products, made or grown by farmers in developing countries who are guaranteed a fair price for their goods.* (www2.marksandspencer.com/thecompany/trustyour_mands/fairtrade.shtml).

Sainsbury’s, the UK’s second largest food retailer, announced in December 2006 its commitment to source all of its bananas (amounting to 2 000 tonnes or about 10 million bananas per week) from certified fair trade resources (Fairtrade Foundation, 2006). In the USA, McDonalds announced in November 2006 that it would sell only fair trade certified coffee in 658 of its restaurants across the northeast (Olsen, 2007). Starbucks is another major purchaser of Fair trade-certified coffee.

Similar approaches exist with respect to wood and fish products. For example IKEA has banned the use of timber from intact natural forests, except those forests that have been certified by the Forest Stewardship Council (FSC). In the USA, Wal-Mart has been working with WWF and Conservation International to support supply fisheries that are embracing sustainable practices and helping them move towards Marine Stewardship Council (MSC) assessment.

3.8.5. Channel fiscal revenue from natural resource extraction towards pro-poor investments

Some countries have successfully used their natural resource wealth to stimulate growth for poverty reduction. They have done this by levying taxes on the extraction of natural resources and channelling the proceeds to poverty-reducing investments. This can include earmarking certain natural resource revenues for marginalised groups – often those living near the resources themselves.

3.8.6. Promoting a shift from natural resource extraction towards more value adding activities?⁶

Developing a successful modern economy based on natural resource exports is, in principle, feasible, given the right institutions and policies, as the examples of OECD countries such as Canada, Australia or the Scandinavian nations demonstrate. However, there are risks associated with being highly dependent on a limited number of resource-based sectors and a more diversified economic structure is something that in principle is desirable.

It will be important not to lose sight of what diversification policies can and cannot achieve. First, it must be clear that there is no miracle recipe to achieve diversification overnight. Fostering diversification will be a long drawn out process, and should hence be seen as a long-term goal. Second, there is no shortage of examples of failed diversification policies, and economists know fairly well on the basis of international experience what does not work.

Fiscal irresponsibility as well as large-scale state investment in pet industrial projects rank at the top of the list of what should be avoided. Unfortunately, there is less agreement among economists about what *does* work, as policies that work well in one place often fail dramatically elsewhere. Indeed, failures have been so common (and sometimes so spectacular) that, in recent years, economists have often preferred not to give any advice at all with respect to diversification policies.

Nevertheless, there are some policies that are helpful in fostering diversification and that should be fairly uncontroversial. Broadly speaking, they consist of getting framework conditions for entrepreneurship right, making sure that the business environment is generally competitive and that there are sufficient incentives to invest in non-resource sectors. As such, they involve a large number of structural reforms typically advocated by mainstream economics.

The most obvious conventional measure is to use the tax system to assist the development of the non-resource sector. The types of tax policies required are similar to the ones needed to combat the Dutch disease. The guiding principle should be to make extensive use of taxes that specifically target the resource sectors, which in turn allows low general tax rates.

In addition to tax policy, there is also a long list of structural reforms, including financial sector and administrative reform, which would be particularly important for facilitating the diversification of economic activity. Mechanisms for efficiently allocating investment resources across – and not merely within – economic sectors are important.

Setting up framework conditions to allow the banking sector to develop – while making sure that it remains in good health – is thus a key priority.⁷ At the same time, there often is a crucial need to improve basic framework conditions for business, particularly

small and medium enterprises (SMEs). In many resource-based economies, there is large scope to reduce the burdens imposed by heavy regulation and an often corrupt bureaucracy, which in addition to strengthening the financial system, would help to create a more level playing field and decrease barriers to entry.

However, reasonable doubts have been voiced as to whether these policies would prove sufficient to achieve the stated goal of diversification in a reasonable time span.

3.8.7. “New style” interventions

While acknowledging the need for good framework conditions for business as a *sine qua non*, some economists advocate the pursuit of “new style” industrial policies as a supplement to the structural reform agenda. “New-style” interventions⁸ recommend the creation of programmes directly to improve the productivity and competitiveness of selected enterprises, which would to some degree serve as an example for other entrepreneurs. The guiding features of such policies usually include that they be highly transparent, that participation in these programmes be determined by private sector representatives, and that the period during which any single enterprise can participate in such a programme be strictly limited.

Programmes should not involve significant transfers of resources to participating enterprises, but rather focus on the transfer of knowledge or skills, such as new production, management or marketing techniques, or the dissemination of specific information (*e.g.* about potential export markets). An extensive discussion of “new style” industrial policy can for example be found in Drebenstov (2004).

Notes

1. This section draws from Ahrend (2006).
2. Strong sustainability is based on the concept that natural capital is a complement to manufactured capital rather than a substitute.
3. The tradeoffs between local and global-levels benefits (*e.g.* carbon capture, biodiversity conservation) are even more difficult to address. They can only be addressed through international co-operation and financing those global benefits derived from a country's actions. This is the objective of the Global Environment Facility (GEF), and of international agreements to deal with such issues, including the Kyoto Protocol.
4. This section has drawn on the work of Giraud and Loyer (2006) “Natural Capital and Sustainable Development in Africa”, Agence Française de Développement, Working Paper 33.
5. For a more in-depth discussion of rates of return to environmental investments see Pearce (2005).
6. This section draws from Ahrend (2006).
7. Developing a sound banking sector is complicated by resource dependence, as it makes it more difficult for banks to achieve sufficient sectoral diversification of their loan portfolios.
8. For a theoretical foundation of “new style” industrial policy and a survey of various international experiences in this field see also Rodrik (2004).

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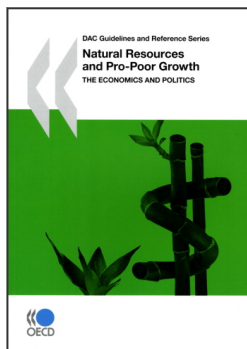
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