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**FINANCING MECHANISMS FOR ENVIRONMENTAL INVESTMENTS AND
SUSTAINABLE DEVELOPMENT**

by

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International Environment Program
Harvard Institute for International Development
Harvard University
December, 1994

Prepared for the United Nations Environment Programme's Consultative Expert Group Meeting on the Use and Application of Economic Policy Instruments for Environmental Management and Sustainable Development, Nairobi, August 10-12, 1994.

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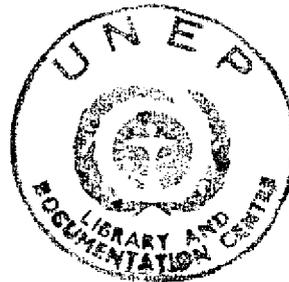
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Preface and Acknowledgements

Economic growth, sustainable development and poverty eradication are the first and overriding priorities in developing countries and are themselves essential to meet national and global sustainability objectives. To meet existing and impending environment - development requirements, practical and innovative thinking about revenue generating mechanisms and market incentives are required.

This paper surveys the financial needs, available resources and the remaining deficit in financing sustainable developments. It also shows how the pronouncements and programmes of Agenda 21 can be financed through an array of funding sources and financing mechanisms.

The document was prepared as a background paper for discussion for the UNEP sponsored Consultative Expert Group Meeting on, "the Use and Application of Economic Instruments for Environmental Management and Sustainable Development.

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CHAPTER 1

INTRODUCTION

Sustainable development is a "bankable concept" in the sense that it involves investments in the present for much larger benefits in the future; benefits whose discounted present value is higher than the current investment cost. In other words, the net present value of sustainable development is positive; therefore, we should prosper rather than go bankrupt by practising sustainable development. Otherwise, sustainable development ought not to be an objective to which we aspire and are prepared to make sacrifices to attain.

The fundamental premise (and promise) of Agenda 21 is that sustainable development is an eminently bankable concept provided that (a) we properly value and fully account for all its costs and benefits and (b) we take an adequately long-term view of things and/or use a suitably low discount rate. The problem is that many developing countries are too poor and too indebted to have either a sufficiently long perspective or to secure, at commercial rates, long-term financing of their transition to sustainable development. Traditional development assistance is either inadequate or unavailable because of inadequate "conventional" returns or unaccounted global benefits.

In such circumstances, a case can be made for longer term loans with the incremental cost for the generation of global benefits funded by an outside grant. In most cases, however, the transition to sustainable development can be justified in conventional lending terms: it involves the removal of distortive subsidies, the construction of a mass transit system or a waste treatment facility that can be financed with user charges or cross-subsidized by environmentally harmful activities. Other examples are reforestation of watersheds, soil conservation, land titling, rehabilitation of depleted fisheries or degraded pastures, education, training, etc. For instance, it would take time for women to be educated and given employment opportunities and for these measures to result in a reduction in fertility. But in the long run, these projects will more than pay for themselves and therefore what we face is a cash flow problem. To solve it we need a loan, a collection mechanism (e.g. taxes or charges), and a favorable repayment schedule.

Many changes, however, needed to put the economy on a sustainable development path, may not even involve any investments, but simply a change in the incentive structure to induce less wasteful and more environmentally sound behavior. Examples include the removal of energy and pesticide subsidies, increased taxation of resource exploitation, and the introduction of pollution charges. Such policy changes require a relatively modest enforcement cost and perhaps a cushioning of the effect on low-income groups, but the funds generated by these economic incentives or disincentives are more than adequate. Indeed, they turn out to be major sources of funding for other environmental investments. But their primary role should be incentive rather than fund raising.

Financing of sustainable development must always be incentive financing, a concept that has at least two meanings:

- a) The financing instrument should not only be non-distortive, but it should also aim to mitigate a market failure, internalize an externality, and correct the incentive structure. Most of the desired pollution abatement should be accomplished through waste minimization and abatement at source induced by a charge, and only residual abatement (if any) should be financed from the revenues collected from the charge.
- b) Financing of environmental investments should be of catalytic, multiplier or leverage value to raise additional financial resources or induce policy changes.

Sustainable development can indeed be defined operationally in terms of its financing. Development that does not pay its full costs (including environmental and social costs) along the way is socially non-optimal and non-sustainable. Development that pays its full costs is both socially optimal and sustainable. It is only by inextricably linking the provision of incremental environmental infrastructure, the conservation of resources, and the protection of the environment to private (and public) investments that place additional demands on existing infrastructure, natural resources, and the environment, that sustainable development will be attained and sustained.

Therefore, sustainable development cannot be defined separately from its financing. If we do not know how to finance sustainable development, then we do not know what ultimately sustainable development is. To be sustainable, an activity must ultimately be self-financed, even though it may need a short-term injection of outside funds to solve a cash flow problem. Similarly, sustainable development cannot be achieved and sustained through indefinite dependence on injections of resources from outside. It must be endogenously generated. Outside financing can only play a temporary role which must have a catalytic or demonstration value.

The objective of this paper is to assess the financial needs, available resources, and the remaining financing gap for sustainable development and to identify financial resources and mechanisms for closing this gap. Contrary to the prevailing pessimism regarding the prospects for additional financial resources to implement Agenda 21 – after all, less than 1 per cent of the estimated “Earth Increment” above Official Development Assistance (ODA) levels has materialized since the Rio Conference – the current study concludes that there is no scarcity of financial resources to pursue sustainable development. First, the financial needs and hence the financing gap have been grossly overestimated under a business as usual scenario that attempts to “buy” (or mandate) rather than induce and leverage sustainable development by removing barriers and providing incentives. Second, there is enormous potential for redeploying and making more efficient use of existing resources. Ignoring this opportunity and seeking additional resources amounts to “throwing good money after bad money”.

Third, resource scarcity, including financial is a fact of life. No enterprise or nation, however wealthy, has at its disposal all the financial resources needed to pursue every worthwhile project. Priorities must be set and choices made. Sustainable development is no different. Fourth, there is great scope for saving funds (reducing expenditures) and

generating additional resources from existing fiscal and financing mechanisms such as the taxation and public expenditure systems, the pricing of utilities and public services, the pricing and taxation of natural resources, the privatization of public enterprises, the reform of property taxes, the collection of charges and fines, the conversion of external debt, and the operation of special environmental funds.

Finally, there are literally dozens of new and innovative financial mechanisms for raising additional domestic and external resources for sustainable development including economic instruments such as betterment charges, impact fees, green taxes, performance bonds, tradable development quotas, land use taxes, as well as "global" mechanisms ranging from joint implementation to tradable GHG permits, from carbon offsets to forest compacts, from tradable conservation services to biodiversity prospecting concessions and profit sharing arrangements.

What is lacking is not money to finance sustainable development but the political will to act innovatively and decisively to translate sustainable development from a political slogan to an operational objective and ultimately a reality. Without correction of the pervasive policy and market failures that fuel the prevailing anti-environment and anti-sustainability behavior and culture (despite the rhetoric), additional financial resources made available even at zero cost, will "simply pull the global economy a little further along an ultimately unsustainable track instead of switching it to a track that leads to sustainability."¹ Political will, not money, is the ultimate resource and regrettably a very scarce one. Had the world had the vision and the political will to discuss and accomplish in Stockholm in 1972 what was accomplished in Rio in 1992 (Agenda 21 and the framework for the global conventions), we would have now been ahead of the curve rather than behind it and the financing gap would have been much narrower. There is little doubt that the economic instruments of internalization and financing discussed in this and the companion study would by now be widely accepted and would become part of the orthodox thinking in 10 to 20 years time. However, as it is now, the world economy has veered so far off the sustainable track that the financing gap might be unbridgeable. Full-cost pricing may take that long to implement if we begin today, but what counts is the effect of a commitment to full-cost pricing on the formation of the expectations of investors, producers and consumers.

Vincent J., "Sustainable Development, Financial Issues, and Multilateral Policy Reform," Harvard Institute for International Development, p.1, March 1994.

CHAPTER 2

FINANCING NEEDS FOR SUSTAINABLE DEVELOPMENT

Financial Needs

The financial needs of individual countries and of the global economy to pursue sustainable development depend critically on what is assumed about national and international policies. Under a business as usual scenario, without correction (or at least mitigation) of policy and market failures and a change in the incentive structure, the financial needs of sustainable development are daunting. The analogy is with the effort needed and energy expended in swimming against the current, a great deal of energy is spent just to offset the force of the current. Similarly, under a business as usual scenario (i.e., without policy reforms), as much as 90 cents in every dollar would go to offset the subsidization (explicit or implicit) of environmentally harmful and unsustainable activities by policy and market failures. This is so because the world is spending annually about US\$1 trillion in direct and indirect subsidies to energy, water, agrochemicals, marginal agriculture, deforestation, and heavily polluting industries that degrade the environment far beyond free market levels. Many of these activities are unsustainable except by virtue of the subsidies. Without phasing out these distortions, sustainable development will be an uphill (or upstream) struggle. What is needed is a reversal of the flow not a march at a different pace in the wrong direction.

With the removal of the barriers to sustainable development and of the perverse incentive structure, the financial needs (both national and global) are dramatically reduced but not eliminated altogether. However, both the policy reform and the internalization of external costs through economic instruments are likely to save financial resources as well as generate new ones thereby further reducing the need for additional resources.

Keeping the above points in mind, we may classify financing needs as (a) private vs. public and (b) internal vs. external. The **private sector** needs funds to comply with regulations, to pay pollution charges, to undertake environmental investments, to retrofit or relocate existing plant and equipment, to redesign products and to invest in technological innovation. Provided that regulations and/or environmental charges or other internalization instruments are introduced gradually and existing firms are grandfathered during the adjustment process, private sector needs can be financed internally or through commercial borrowing. Where the objective of economic instruments is to change the behavior rather than generate revenues, the funds collected from, say, pollution charges may be returned to the private sector in the form of subsidies for environmental investments or reduction of corporate and other business taxes. Revolving funds by industrial groups and associations and green funds by environmentally-minded investors constitute additional sources of financing that can be mobilized to meet the private sector's environmental financing needs. Finally, an increasing number of industrial firms, especially in OECD countries (e.g., 3M, Dupont, Dow Chemicals, Volvo, Bayer) report that in response to environmental regulations, they have uncovered within their firms a large number of

environmental projects that generate surplus financial resources (profits) that can be used to undertake further environmental investments within their particular firms. For example, in the United States, 3M reports that over a 10 year period more than 1000 such projects have been identified and implemented generating profits of over US\$1 billion. [For an economic analysis of these win-win opportunities, see Panayotou and Zinnes, 1993].

The **public sector's** financial needs for environmental management and sustainable development are varied and far reaching. Financial resources are needed to combat poverty and improve health, to halt deforestation and control desertification, to reduce population pressures and protect fragile ecosystems, to rehabilitate deforested watersheds and promote sustainable agriculture, to provide clean water and sanitation and to address urban congestion and air pollution problems, to mention only a few. Clearly, no developing country has the resources to directly address all these problems, not even to stabilize environmental degradation at current levels. Nor are there prospects that adequate resources can be transferred from external sources to address these problems through direct public sector investment. Therefore public sector expenditures are by necessity limited to interventions that have catalytic or demonstration value and that leverage additional resources from the private sector (both domestic and foreign) and which finance the supply of public goods that are undersupplied by the market. The financial needs of the public sector in its role as facilitator and regulator of economic activity are defined by the costs of establishing the necessary institutions and incentive systems for advancing sustainable development. These costs include design, information, administration and enforcement costs, as well as the cost of supplying the basic environmental infrastructure (legal, human and physical). Like the private sector, the public sector may find that a good part of the needed financial resources can be found within the sector through win-win interventions (the phasing out of distortive subsidies, redeployment of existing resources, revenues generated by incentive systems, etc.).

The Need for External Financial Resources

Despite the prospects for reducing financial needs and generating additional funds from domestic sources, the need for the infusion of external financial resources is not eliminated, although it is substantially reduced. External financial resources are needed for at least five purposes: First, due to the domestic capital constraints there is a need for external financing to bridge the gap between the domestic demand (both private and public) and the domestic supply. While correction of capital market imperfections (e.g., interest rate ceilings) is the first best solution to the capital constraint, it is neither sufficient nor implementable overnight without undue disruption. Second, external funds are needed to resolve "cash flow" problems arising from the time distance between the benefits and costs of projects and policies. While sustainable development is a bankable concept, the benefits may not accrue for a number of years, while the costs need to be paid today, necessitating long-term bridge financing which is scarce and often unavailable in developing countries. Third, financing is often needed for cushioning the short-term impacts of policy reforms or to pay compensation to those adversely affected or to build consensus for the reforms. Availability of external sources of funding for this purpose can encourage and leverage policy reforms.

Fourth, external resources are necessary for financing the foreign exchange components of investments, and to build investors' confidence as well as to leverage domestic sources of financing; it may also have demonstration benefits. Fifth, cleaning up past contamination (e.g., hazardous waste sites) and restoring damaged natural resources tends to be extremely costly and capital-and-technology-intensive, and it cannot be accomplished with domestic resources without distortive or excessive taxation and crowding out of other investments. Therefore such clean up should be limited to sites with significant health impact or productivity losses and financed with external financial resources to the extent possible.

Finally, and most importantly, there is a need for external financing (in the form of grants than loans) to internalize global externalities or to pay the incremental costs of projects which have both local and global benefits which would not be undertaken otherwise. This type of external financing does not represent development assistance or resource transfer, but payment for conservation services provided to the global community by developing countries over and above what they are willing to provide on account of their own self-interest. This financial need may arise from international conventions or simply from pressures from developed countries or the global community to conserve resources of global value. It may also arise from the host country itself wanting to avoid irreversible losses of environmental assets in earlier years (when poorer) that may be highly valued in later years (when richer).

Financing Requirements of Agenda 21

The UNCED Secretariat estimated that implementation of all activities under Agenda 21 during 1993-2000 would require additional resources of US\$125 billion a year, or 1 per cent of the North's GNP. In addition, Governments and the private sector in the South would need to expend another US\$500 billion a year to put their economy on a sustainable development path. While only tentative estimates, these figures help put into perspective the progress achieved during and since UNCED to secure the resources for the transition to a sustainable economy.

The external finance figure of US\$ 125 billion was arrived at the UNCED Secretariat by estimating the cost of addressing sector- and resource-specific environment and development problems. The sectoral distribution is given in Table 1 below. The total estimate of external financial needs is within the same order of magnitude of estimates by other sources. The World Watch Institute has estimated the concessional finance needs of sustainable development at US\$145 billion annually (1988 estimate). The WIDER Programme of the UN University has put the figure at US\$60 billion in 1993, rising to US\$140 billion by the year 2000. The World Resources Institute estimated the additional financial resources need at the more modest level of US\$20 to 50 billion annually. Even the most modest of these estimates is several orders of magnitude in excess of what has been made available in the post-Rio years and does not appear to be within the realm of possibility in terms of conventional sources of international development financing.

Table 1.
Financing Sustainable Development Estimates Given in "Agenda 21"
for Concessional Additional Funds

Annual Costs US\$ million for the Period 1993-2000

Sector/Policy	Amount (USmn)
Accelerating Sustainable Development	9000
Combating Poverty	15000
Demographic Dynamics and Sustainability	4000
Improved Health	6500
Improved Urban Environment	29300
Protecting the Atmosphere	21230
Planning of Land Resources	50
Combating Deforestation	5670
Fragile Ecosystems	
◦ Desert Areas	4885
◦ Mountain Ecosystems	2400
Biodiversity	1750
Biotechnology	200
Oceans	902
Fresh Water Resources	17040
Toxic Chemicals	225
Hazardous Wastes	1250
Solid Wastes	1250
Radioactive Effects	64
Sustainable Agriculture	5100
TOTAL	131,416

*Note: The total does not match the Agenda 21 figure of \$125 bn. This may be due to some double counting.
Source: A. Markandya, "Financing Sustainable Development: Agenda 21" Harvard Institute for International Development, Harvard University, Cambridge, MA (March 1994).*

Available Resources

The resources available from domestic sources for financing sustainable development are very difficult to estimate. They are not earmarked as such in the budget, and when they are, the designation is often not meaningful. Funds generated by environmental agencies or allocated to them from the central budget are but a small fraction of the domestic resources that actually contribute to sustainable development and even a smaller fraction of the resources potentially available for sustainable development. In the long-run the available resources are defined by the country's revenue mobilization capacity which is determined by the national income and by the private and public sectors' propensity to save. The percentage of GNP saved and invested varies among countries from a low of 5 to 10 per cent to a high of 30 to 40 per cent. Sustainability requires that the formation of new capital (human, man-made, natural, and environmental) equals the sum of rents from natural resource depletion and environmental damage. For sustainable development, capital formation needs to be even higher. To this, one should also add the cost of rehabilitation of degraded resources and environmental clean up to the extent that it is worth doing. Therefore, it is possible to determine whether a country saves and invests sufficiently to sustain (or raise) current living standards and environmental quality by comparing aggregate savings (net investments) to rent generation (revenue depletion) and environmental damage incurred. By this measure (which is quite generous because it assumes perfect substitutability between different forms of capital), many developing (and quite a few developed) countries would not qualify as sustainable economies.

While there is wide scope for increased domestic resource mobilization (higher rates of savings), the UNCED estimated that the domestic financing gap of US\$500 billion annually cannot be viewed as available to be raised through increased savings alone, for it accounts for almost 10 per cent of the developing world's GNP. At least one-half of the amount will have to come from redeployment and more efficient use of existing resources and from removal of barriers to economic growth and sustainable development (see section below).

As discussed in the previous section, external financial resources are also needed to supplement and to leverage domestic resources of ODA amounts to US\$60 billion or 0.33 per cent of the GNP of OECD countries (1992 figures). This figure is clearly inadequate when compared with the estimated financial needs of developing countries and with the outflow of resources for debt servicing at the level of US\$60 to 70 billion annually. The goal of Agenda 21 was to raise additional external funds for sustainable development in part by increasing bilateral and multilateral ODA to 0.7 per cent of the GNP of OECD countries. Were this goal feasible, half of the estimated external financing need would have been met. The chances of this happening, however, are minimal considering the political difficulties of maintaining even the current levels of ODA. While some additional concessional financing could be forthcoming for special programmes such as population, literacy, and environment, the ODA is not expected to contribute substantially to closing the external financing gap.

Various approaches to debt relief, such as debt rescheduling, debt-for-equity, or debt-for-nature swaps and debt forgiveness have contributed to a reduction of the outflow of financial resources from developing countries and can continue to make contributions to external financing for those countries which are actually servicing their debts. In this regard, debt-for-policy reforms or debt-for-sustainable development may have a greater promise than the narrowly conceived debt-for-nature swaps. Again, this is not expected to be a major source of external financing of sustainable development.

All three conventions dealing with global issues: climate change, biodiversity, and the ozone layer have recognized the need to transfer financial resources to developing countries to enable them to comply with their provisions. However, only the Montreal Protocol has provided specific amounts (US\$260 million in 1991-93 and US\$480 million for 1994-96). In addition, US\$1 billion a year has been made available through the Global Environmental Facility for projects that have global benefits. Neither these special official funds for global environmental issues nor the considerable and growing assistance from environmental NGOs are likely to narrow substantially the external financing gap, although they make important contributions to specific areas. By far the greatest promise is to be found in private sector finance (direct foreign investment), trade reforms and innovative mechanisms of international transfers such as joint implementation (e.g., carbon offsets), international environmental taxes (e.g., carbon taxes), internationally tradable emission permits, and payments for conservation services (e.g., transferable development rights), to be discussed in later chapters.

The Financing Gap

The UNCED figures given above are indeed estimates of domestic and external financing gaps. Our assessment is that these figures are gross overestimates because they are based on a business as usual scenario. Sustainable development under a business as usual scenario, however, is unattainable, even if these resources become available. Sustainable development calls for fundamental reforms to reduce barriers to efficient use of resources, conservation, and technical development, and to redeploy existing resources in a more efficient and targeted way. If these reforms do take place, the financing gap is significantly reduced but not eliminated. Additional resources would be necessary to augment more efficiently used existing resources in an environment that enables rather than hinders technological development and transfer (see Figure 1).

A second distinction needs to be made between financial resources needed to meet short-term cash flow problems and incremental resources needed to augment existing resources. Cash flow problems are temporary financing gaps arising from the lumpiness of new investments, stretched-out return streams, and imperfect capital markets. Such gaps between expenditures and returns can usually be addressed through bridge loans, revolving funds, and government-guaranteed loan schemes. In the case of technology development there are the added problems of uncertainty of returns, long gestation, and the inability of investors and innovators to capture the full return of their investments due to the public good aspects of technology development. These two factors blur the distinction between

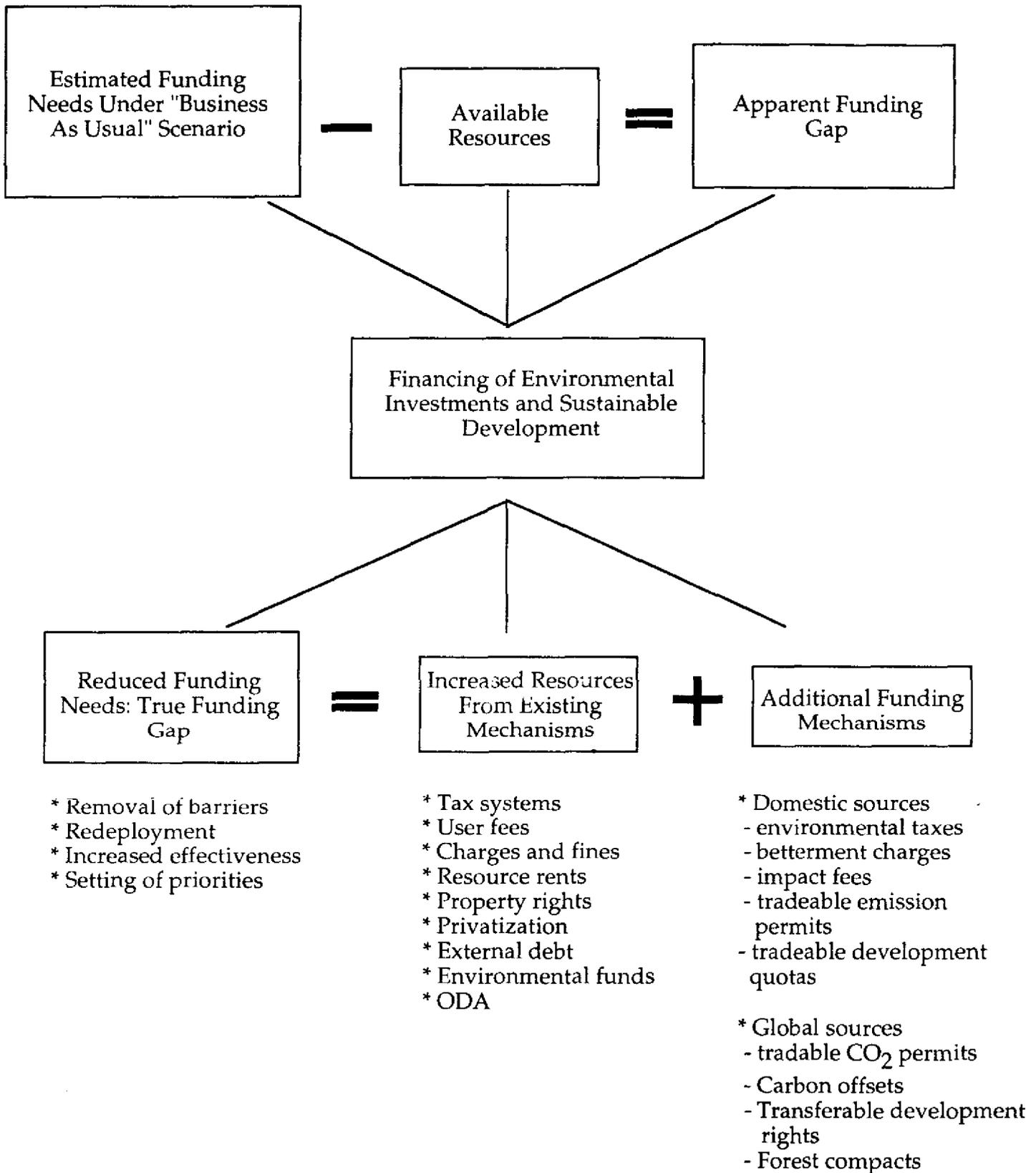
the cash flow gap and true resource gaps, and can usually be addressed through incentives for increased venture capital, introduction of a patent system for new technologies, and partial public funding of research and development with significant public-good aspects.

The need for additional resources, as distinct from the cash-flow gap, arises from the imbalance between a country's need for capacity building (both for human resources and institutions) and provision of a basic infrastructure for technology development on the one hand and the ability of the country to mobilize resources due to a combination of low income levels and a poor tax collection system. Any augmentation of resources can be accomplished through existing mechanisms such as the fiscal system, user charges, resource rent capture, and privatization as well as through new innovative mechanisms such as, environmental taxes, betterment charges, tradable emission permits, etc. (see Figure 1). Yet, domestic resources in much of the South may continue to be inadequate for financing the development transfer and commercialization of environmentally sustainable development due to limited tax and capital bases, underdeveloped taxation systems, capital markets, and the diversion of substantial resources to servicing foreign debt.

The main vehicle for the augmentation of domestic resources of developing countries from external sources has been bilateral and multilateral development assistance. Despite the relatively large sums of money involved, development assistance falls short of the needed resources; as we have indicated above, the outflow of resources from the South for servicing foreign debt exceeds the inflow of resources from development assistance. While the case for increasing development assistance to developing countries has been made, more promising are innovative mechanisms such as matching funds for policy reform, debt for equity swaps, North-South technological cooperation, and creative trading arrangements that enhance both the external resource inflow and the domestic resource base.

Finally, part of the inadequacy of domestic resources in the South and the need for external augmentation arises from the added expenditure needs for conserving resources of global value, such as biodiversity and the global climate. While developing countries also stand to benefit from policy changes, institutional reforms, and technological investments that would preserve the "global commons," at their current level of income and discount rates, they can ill afford the necessary expenditures if they cannot be recovered from adequate domestic returns. Here, there is a need for incremental cost financing of investment and technologies that generate global benefits through innovative international financing arrangements such as the Global Environmental Facility, internationally transferable development rights, and various joint implementation activities between the North and South such as carbon credits and offsets and joint biodiversity/biotechnology development ventures (see Figure 1).

Figure 1. Financing Needs and Sources for Sustainable Development



CHAPTER 3

REDUCING FINANCING NEEDS

Removing Barriers and Distortions

As discussed above, the apparent financing gap is inflated by the existence of multiple barriers to sustainable development. These barriers may be classified into two groups: policy failures and market failures. Policy failures or market distortions are government interventions that distort market signals against efficient use of resources, and reduce incentives for the conservation of increasingly scarce resources, for the protection of fragile environments and for resource saving technological developments. Prominent among market failures are energy and capital subsidies, industrial protection, depletion allowances, and capital rationing. Energy subsidies are a tax on energy efficient and hence on energy-saving technologies. Capital subsidies are a tax on labor employment, which, in an environment of abundant labor, leads to encroachment on natural resources such as forests and fisheries by unemployed or underemployed labor. Industrial protection limits external pressures to improve efficiency and to adopt new technologies and products that are environmentally and economically more sustainable. Depletion allowances for new materials are a tax on reuse and recycling, and hence on the development and transfer of recycling technologies. Interest rate ceilings and capital rationing deprive small-holder agriculture, rural industries, and small-businesses of the funds necessary for capital investment and technological innovation.

Removing or phasing out costly subsidies that distort the economy and subsidize waste and environmental degradation is the single most cost-effective means of financing sustainable development. Examples include subsidies for fossil fuels, electricity, water, pesticides, logging, land clearing, construction materials, capital-intensive industries, etc. While removal of these subsidies would not be easy because of vested interests and political economy considerations, their gradual phasing out over a period of years is not without precedence. The phasing out of pesticide subsidies in Indonesia, of oil subsidies in Thailand, and of ranching subsidies in Brazil offer grounds for optimism. The Phasing out of subsidies contributes in four ways to sustainable development:

- a) it frees up budgetary resources which can be spent on poverty alleviation, resource conservation, women's education and other similar investments that advance sustainable development;
- b) it removes a major economic distortion thereby improving efficiency and raising economic growth, a *sine qua non* condition for sustainable development;
- c) it improves income distribution since most taxes are regressive and subsidies disproportionately benefit the rich (e.g. capital and energy subsidies);

d)it improves the environment not by spending new money but by saving money and realigning the incentive structure in favor of environmentally sound practices (e.g. from pesticides to integrated pest management; from energy supply expansion to energy demand management).

Market failures form a second set of barriers preventing a country's economy and technology system from getting closer to a sustainable development path. The most severe forms of market failure are insecure property rights, unaccounted externalities, public goods, myopic markets, and high transaction costs. Insecure property rights affect agricultural land, forest, fisheries, and pastures, and result in excessive and wasteful resource use and underpricing of scarce resources. The result is underinvestment in improved-recovery technology, in development of substitutes, and in resource conservation. Failure to protect intellectual property rights results in further disincentives for invention and innovation.

Externalities are side effects of economic activity and they can be positive or negative depending on their impact on other activities. For example, the environmental externalities of burning fossil fuels include local pollutants (CO₂, NO_x, SPM) that affect human health, regional pollutants (SO₂) that affect agriculture and property downwind, and global pollutants (CO₂, methane, etc.) that contribute to global warming. Failure to regulate, or cost and charge such negative externalities results in overconsumption of fossil fuels, excessive rates of emission, and discouragement of the development, transfer, and adoption of more energy-efficient production technologies, of pollution control and abatement processes and equipment (e.g., desulphuration of coal, electrostatic precipitators), and of alternative less polluting fuels. Similarly, failure to introduce standards or charges for liquid and solid waste discourages the development, transfer, and adoption of waste minimization, waste treatment, and recycling technologies. Markets also tend to be myopic, underinvesting in resource conservation and technological development. Tax relief for long-term capital gains and private-public sector cost sharing of research and development for ESTs would help remove this barrier to sustainable development.

Clearly, the removal of policy failures and the correction of market failures would go a long way towards narrowing both the technology and the financing gap for sustainable development, while saving budgetary resources that can be used to support activities and investments that promote rather than hinder sustainable development. For example, the removal of fossil fuel subsidies will not only reduce the emissions of local and global pollutants but will also free up budgetary resources for investment in renewable energy, development of more energy-efficient technologies and the enhancement of sinks (e.g. reforestation). This brings us to the next means of closing the financing gap: the redeployment of existing resources.

Making More Effective Use of Existing Resources

Part of the financing gap could be closed through redeployment and more efficient use and targeting of existing resources including domestic development funds, environment protection budgets, and international development assistance.

No government or development assistance agency could claim that its current allocation of budget and development funds coincide fully with the allocation that would best advance Agenda 21. The current allocation of resources is largely a legacy of pre-UNCED decisions, the Cold War, inertia, and vested interests. While it would take time to sufficiently redeploy existing resources to fully coincide with the priorities and objectives of Agenda 21, a partial adjustment is possible even in the short-term. For example, more of the educational budget and human resource development funds could be directed towards the education of women (to induce a reduction in fertility and child mortality and improve resource management at the family level), and towards the building of human resource and institutional capacity for furthering sustainable development in the coming years. Another example of desirable and feasible reallocation of funds that would advance Agenda 21 is to reduce emphasis on supply expansion and to increase resource allocation to demand management, increased use efficiency and resource conservation, and to improve operation and maintenance of existing systems.

Nor is current resource allocation economically efficient and socially equitable. A large share of scarce financial and capital resources is tied up in the construction of prestigious megaprojects (airports, highways, refineries, long-range power lines, steel mills, etc.) which generate low returns and little employment. At the same time, low visibility projects (such as repair of rural roads, safe water and sanitation, soil conservation, and watershed protection), which would generate both high returns and considerable employment are not undertaken due to lack of financial resources.

In many mixed and formerly planned economies, public utilities' state enterprises and parastatals absorb a significant portion of the state budget without contributing to welfare improvement. On the contrary, reduced competition, a soft budget constraint, and underpricing of products and services compounds the misallocation and inefficient use of resources and results in substantial welfare losses. The privatization of state enterprises is likely to save a substantial portion of the national budget for sustainable development investments, as well as to improve economic efficiency and reduce waste in the provision of public services and other products currently produced by state enterprises. Efficient private provision of public services can be effected through competitive bidding with adequate safeguards for equity and environmental protection.

The privatization of state enterprises would guarantee three direct sources of funding available for investments in sustainable development and other uses: a) additional government revenues from the sale of state enterprises; b) savings in government

expenditures by no longer having to finance state enterprise deficits; and c) additional tax revenues from an expanded tax base that the more efficient production would bring about.

Another sector where significant resources can be redeployed to advance sustainable development is the military. First, in the post-Cold War years, ethnic conflicts notwithstanding, some shift of resources from the military to other sectors is a viable option for most countries. A 10 per cent reduction of military expenditures worldwide could generate as much as US\$100 billion per year, or a quarter of the financing gap for sustainable development once the barriers are removed. Second, the military could redeploy its considerable human, organizational, and technological resources to transform itself from an environmentally destructive force into an agent of environmental recovery and sustainable development. Third, much of the military knowledge, skill, and technology can be redeployed for commercial uses, thus alleviating part of the technological gap and corresponding financing gap. Military conversion is already under way in many formerly planned economies, but there is also considerable scope for conversion in market economies.

A last but significant type of resource redeployment is the re-targeting of existing funds from low- or unsustainable-return technologies (e.g., import substitution, waste treatment) to high-return, low impact technologies (e.g., renewable energy, waste minimization, and pharmaceuticals from local biodiversity resources).

For development assistance agencies and environmental support groups, the challenge is to lead by example (i.e. to redeploy their own resources in such a way as to integrate environment and development in the spirit of Agenda 21). Ultimately, the implementation of Agenda 21 depends on the capacity of developing countries to reform their policies and restructure their economies to speed up growth while slowing down — even reversing — environmental degradation. The necessary changes call for analytical and integrative skills, as well as an institutional infrastructure, which are in short supply in most developing countries. Development assistance agencies need to recast and restructure their existing projects and resources to achieve the critical means necessary for elevating developing country capacity to levels that would enable a transition to sustainable economies. This requires more investment in policy research, reform advocacy, and policy dialogue as well as technical assistance, demonstration and pilot projects, and catalytic and strategic interventions.

Setting Priorities

While the financing gap can be halved and the resources available for sustainable development doubled by removing barriers and distortions and by making more effective use of existing resources, the basic scarcity of resources remains, necessitating priority setting and efficient allocation, not only across uses but also over time. Not all apparent needs can be addressed simultaneously — even where

financial resources are not binding, human, institutional, and administrative resources may be binding. If sustainable development is to be the operative objective of policy and public investment, the use of limited financial (and other) resources must be allocated among competing uses in order to equate the present value of "sustainable" returns at the margin between uses at the same and different points in time. By "sustainable" returns we do not mean that each activity must, by itself, be sustainable but that each activity should contribute towards making the economy sustainable by accounting for all of its costs and benefits.

In practical terms, the highest priority investments are those that safeguard and enhance the country's resource base, and the natural, human, and man-made productive capital. High priority policies and investments often include averting irreversible damages to ecosystems, protecting critical watersheds, the education of women, employment of the labor force, security of property rights, poverty alleviation, encouragement of high rates of savings, and a conducive environment for domestic and foreign investments, and the development of mechanisms for internalization of environmental costs. Within these broad areas, specific priorities would vary from country to country, according to the level of development, the structure of the economy, resource endowment, and inherited legacies and problems. Where fundamental reforms are needed to return the economy to a sustainable path, substantial financial resources would be needed to secure the support of influential sectors of society or to cushion short-term, adverse impacts on vulnerable socioeconomic groups. The key is to remove the perverse incentives and replace them with positive ones without imposing undue hardships or creating strong opposition to the reforms. The objective of reforms should be correction of policy and market signals not punishment or hardship. If indeed, reforms are beneficial over the long haul (i.e. have a positive net present value), the highest priority use of financial resources is to leverage and support these reforms.

CHAPTER 4

ADDITIONAL RESOURCES FROM EXISTING MECHANISMS

Reform of the Tax System

Conventional taxation systems throughout the world tax work, income, savings, and value added and leave untaxed (or even subsidized), leisure and consumption, resource depletion, and pollution. The implied reduced incentives for work, savings, investment, and conservation and increased incentives for leisure, consumption, resource depletion, and environmental degradation result in less growth and more environmental degradation than would have been the case had incentives been reversed.

A reform of the fiscal system that would reduce conventional taxes and replace them with environmental taxes — so as to leave the total tax burden unchanged — would bring the economy closer to sustainable development by stimulating economic growth and resource conservation and discouraging resource depletion and environmental pollution. This is clear to see because the existing fiscal system of taxing social benefits introduces market distortions, while a reformed system that taxes social costs would remove market distortions and mitigate market failures. A fiscal reform, which is by design revenue-neutral, could not generate additional revenues but it would save government expenditures on environmental regulation and pollution abatement; it would indirectly advance the objectives of Agenda 21 of more economic growth with less environmental destruction; and, in the long run, it would increase the tax base — and hence tax revenues — without increasing the tax burden.

While an overnight shift from “taxes on value” to “taxes on vice” is unlikely and potentially disruptive, a gradual shift towards environmental taxes would be a move in the right direction. For example, income taxes could be reduced and the lost tax revenues replaced by taxes on gasoline, chemicals, and other polluting products. Of course, it would be more efficient to tax pollutants (SO₂, CO₂) directly rather than polluting products (fossil fuels), but tax setting and collecting would be more complex and costly, especially in developing countries with limited administrative and technical capability. Differential taxation of products and services according to their environmental externalities has been tried with some success in Western Europe and holds even greater promise in developing countries undergoing their formative years of industrial development. It is true, product taxes tend to be regressive, but so are most conventional taxes. Care must be taken in the design of such taxes, so that the overall tax burden is progressive rather than regressive. One way of doing this is by exempting necessities or applying a lower tax rate to products that account for a high share of the poor’s expenditure. Another way is by spending the revenues from such products in ways that disproportionately benefit the poor.

User Fees, Cost Recovery and Marginal Cost Pricing

A significant source of increased financing from existing mechanisms is improved cost recovery from public investments through user fees. Again, only a small fraction of the cost of irrigation water and industrial energy is paid by users; the rest is covered by the diversion of scarce financial resources from other, often more productive uses. Full-cost pricing of public utilities and services is equally significant to augmentation of resources (financing effect) as it is to the removal of barriers (incentive effect) and the redeployment of existing resources (efficiency effect). It is true that full cost pricing implies higher prices for the consumers and producers in the short-term, but the long-term benefits in terms of sustainable economic growth often outweigh these costs, although some cushioning of the impact on low-income groups might be necessary.

Full-cost pricing has many advantages. First, it reduces the burden on the state budget from the deficits of public utilities which do not fully recover their costs. Second, it reduces the need for additional capital to expand supply systems. Third, with increasing supply costs, marginal cost pricing results in financial surplus that can be used to finance environmental improvements, to provide basic services to poor people at subsidized rates, or to make up the revenue shortfall from the reduction of distortionary taxes. Fourth, it conserves natural resources and reduces environmental damage thereby reducing the need for financial resources to undertake defensive or mitigatory expenditures.

For example, meeting growing energy demands by improving energy efficiency and conservation (through full-cost pricing of energy, for instance) rather than by expanding supply obviates the need for new power plants and hence the need for funds to finance scrappers to reduce SO₂ or to plant trees to offset the additional CO₂ emissions. The savings in financial resources could be enormous, while the economy is guided closer to sustainable development. Had Thailand pursued energy efficiency rather than supply expansion through the construction of the Moe Moh lignite power plant, the savings in financial resources from not having to install filter and other anti-pollution equipment would have amounted to US\$400 million.

Similarly, water pricing that improves use efficiency and conservation obviates the need for construction of additional reservoirs, water treatment facilities, and waste water disposal plants to meet growing demand; financial resources necessary for mitigation of environmental impacts of dam construction are also saved. Of course, eventually some supply expansion becomes necessary, but postponement and a smaller scale conserve financial and environmental resources. In financial terms, postponement results in savings in interest payments on capital invested; in environmental terms postponement results in savings due to improved information and knowledge about the resources at risk and the development of environmentally less harmful technologies and substitutes. The challenge for development assistance agencies is to use their limited resources to leverage a policy change that will save a country millions while advancing sustainable development. Capacity building,

policy analysis, feasibility studies, pilot and demonstration projects, policy dialogue, and matching funds for policy change are a few of the instruments that can be brought to bear in effecting policy reform that would advance sustainable development.

Resource Rent Capture

Almost all developing countries exploit, and many export, natural resources such as minerals, forest products, petroleum, and fish. While the rate of resource exploitation in most countries is excessive and possibly unsustainable, little of the growing scarcity rent is being captured by the government and reinvested in the protection and enhancement of the resource and the enlargement of the country's stocks of human and man-made capital, as sustainable development requires.

For example, only 10 to 50 per cent of the scarcity value or stumpage of tropical timber is being captured by governments, and a good part of whatever is being captured is returned to logging companies through public construction of logging roads and log-processing subsidies which encourage increased logging. Log export bans depress the domestic price of logs and subsidize their wasteful use by inefficient plywood mills in the name of increasing the gross value added even as the net value added shrinks and wasteful logging intensifies. The failure to charge logging its full opportunity cost in terms of foregone non-timber forest products and environmental services (watershed protection, biodiversity, etc.) results in further undervaluation of timber, wasteful use, and uncollected rents. Even the means of collecting rents may result in considerable waste. For example, taxes on the amount of timber removed from the logging site (rather than on the amount of marketable timber on the site) result in high grading, partial recovery of logs, and highly destructive logging and relogging. The result is resource exploitation that is excessive and inefficient and tax revenues (and foreign exchange earnings) that are too low and used wastefully.

Billions of dollars a year in additional foreign exchange earnings and government revenue can be obtained by a more efficient resource concession and taxation system. Such a system would provide for longer-term concessions awarded through competitive bidding and taxed efficiently through area-based taxes. With such improvements, not only could wasteful logging be reduced but there would also be more government revenues to invest in forest protection and reforestation. For example, I have conservatively estimated that Indonesia could, by reforming its forest concession and taxation system, increase net earnings from timber by over a billion dollars a year (with more than half accruing to the government as unrestricted revenues) while reducing deforestation below its current rate. However, higher rates of collection of resource rents by governments does not automatically advance sustainable development – it might even retard it if the government's propensity to save and invest in sustainable development activities is lower than that of the private sector. How the revenues from resource rent capture are spent is as critical as the level of these revenues. In some countries, sustainable development could advance

more by either providing private investors with incentives to reinvest resource rents or by collecting and returning to the countries these revenues as a reward for environmentally sound investments, rather than through direct public expenditures.

Property Rights and Property Taxes

Taxes on property, especially land, are a major source of revenue in developing countries and in some countries they are the only source of municipal and local government finance. Yet, property taxes tend to be very low by comparison to developed countries and over time tend to lose their value to inflation. In the tax base, property values are not frequently upgraded. Land use changes and ownership transfers are not always recorded (and taxed) and when taxes are paid they are often based on outdated (and hence too low) property values. Land use taxes are uncommon and capital gains and windfalls are rarely taxed.

Furthermore, insecure property rights over natural resources, especially land, have been a major cause of farmer's lack of access to capital markets and of underinvestment in land improvement, in soil conservation, and in tree planting. This in turn leads to low agricultural productivity, low farming incomes, and encroachment of forests to obtain additional land for cultivation. This also results in low tax revenues and high public expenditures on poverty alleviation, forest protection, and mitigation of off-site effects such as the sedimentation of dams and reservoirs from soil erosion.

Issuance of secure land titles to farmers with insecure ownership results in a doubling or tripling of the value of the land, while the cost of the necessary cadastral surveys, title registration, and other related expenses cost only 2 to 3 percent of the pre-title value. Thus, improved security of ownership over land and other natural resources — a necessary condition for sustainable development — can be self-financed and at the same time generate enormous private and social benefits. Estimates of productivity gains from land titling range between 10 and 30 per cent; investments in land improvements, soil conservation, and tree planting range between 60 and 200 per cent (Feder et.al., 1986). This will also result in increased tax revenues because of the expanded tax base and savings in government expenditures on poverty alleviation and forest protection.

Privatization of State Enterprises

In many mixed and formerly planned economies, public utilities, state enterprises, and parastatals absorb a significant portion of the state budget without generating commensurate social welfare improvement. On the contrary, reduced competition, a soft budget constraint, and underpricing of products and services compound the misallocation and inefficient use of resources, and result in substantial welfare losses. Privatization of state enterprises is likely to save a substantial portion of the national budget for sustainable development investments, as well as to improve economic efficiency and

reduce waste in the provision of public services and other products currently produced by state enterprises. Efficient, private provision of public services can be effected through competitive bidding with adequate safeguards for equity and environmental protection. As the experience of Eastern Europe, the former Soviet Union, and many socialist economies in the developing world amply demonstrates, the environment has suffered as much as the economy in the hands of state enterprises. Privatization, economic restructuring, and price reform are well established and widely accepted as necessary conditions for revitalizing the economy and spurring economic growth; that they are equally important to environmental improvement and sustainable development is less well known and recognized.

Privatization of state enterprises would guarantee three direct sources of funding available for investments in sustainable development and other uses: a) additional government revenues from the sale of state enterprises, b) savings in government expenditures by no longer having to finance state enterprise deficits, and c) additional tax revenues from an expanded tax base that more efficient production would bring about.

Private provision of public services such as water supply, waste water treatment, solid waste collection, power generation, and telephone services would generate similar savings as long as competitive bidding and adequate safeguards against monopoly pricing are adopted. At the same time, unaccounted environmental and social costs must be internalized through regulation or preferably, through economic instruments (see comparison study on economic instruments).

Charges and Fines

In many developing countries the bulk of revenue for environmental investment comes from fines imposed on violators of environmental regulations and, to a lesser extent, from pollution charges. Yet neither of these instruments comes anywhere near satisfying its potential as a source of revenue neither do they act as incentives for behavioral change. Regulations are not consistently enforced and when they are, the fines imposed on violators are far too low by comparison to the expected gain from non-compliance and to the resulting environmental damage or social cost. Their significance as sources of finance is eroded by both their erratic use and inflation. Where fines for non-compliance are set high enough to be binding, as in Poland, they are rarely paid or collected. Charges, on the other hand, are introduced purely as financing mechanisms to defray part of the cost of administering the command-and-control regulation system, and they are not related to any meaningful measure of environmental damage or abatement cost.

Command-and-control regulations such as end-of-the-pipe effluent standards or end-of-the-smoke-stack emission standards and mandated pollution control technologies have been the standard approach to environmental protection in developed and developing countries alike. Poor performance and high compliance and enforcement costs have encouraged many developed and some developing countries to explore the use of economic instruments either in support or replacement of command and control

regulations. First, economic instruments such as environmental taxes, effluent charges and tradable emission permits are known to be more cost-effective than effluent and emission standards or mandated technology in attaining a given level of environmental quality. Second, while regulations generate no revenues and require large budgets and bloated bureaucracies to manage and enforce them, economic instruments, if properly designed, could both save in terms enforcement costs and generate substantial revenues for environmental investments. Third, imposed economic instruments significantly lower compliance costs on industry because they allow polluters the freedom to choose their response in order to minimize their cost of compliance: they can pay the charges, reduce or treat their waste, change their input combination, reduce their output, change their production technology, or move to a different location. For example, in the case of regulations, every firm must meet the same standard or reduce its emissions by the same amount regardless of cost. This is not so with tradable emission permits, here high cost pollution abaters are allowed to undercomply and *in exchange* pay low-cost pollution abaters to overcomply on their behalf in order to achieve the same overall ambient quality level. The savings could be substantial for both the industry and the government.

Thus a move towards increased use of economic instruments for environmental management either in support of or replacement of command and control regulations should be regarded as an indirect mechanism for financing Agenda 21 since both growth and environmental protection are advanced in a cost effective manner, budgetary resources are saved, and new sources of revenue established for investing in sustainable development. At present, the trend is for developing countries to copy the command and control regulations and rigid environmental standards of developed countries even as developed countries are trying to escape from them. Of course, for economic instruments such as charges and taxes to be effective, they must be set at sufficiently high levels to reflect marginal damage and to induce a change in behavior; they must also be protected against inflation and political manipulation. While overnight replacement of rigid regulations by economic instruments is unlikely, it would mark substantial progress towards the objectives of Agenda 21, if economic instruments are introduced as a source of flexibility, incentives, and financing in conjunction with existing standards. The experience of Malaysia with effluent charges, of Singapore with congestion fees, of Poland with a pilot tradable permit scheme, and of Turkey with industrial relocation incentives offers ground for optimism.

External Borrowing and Debt

Agenda 21 calls for the additional inflow of financial resources to developing countries, yet many of them experience a net outflow of resources due to the servicing of huge debts accumulated in the 1970s and early 1980s.

A number of innovative mechanisms, such as debt-for-nature swaps, debt-for-equity conversions, and debt rescheduling have been introduced to relieve the debt burden of developing countries. Yet, these have been palliative measures rather than cures, since many underlying causes of heavy indebtedness have not been reversed. Debt-for-nature

swaps have been introduced enthusiastically but they tend to wither away after the initial publicity; part of the reason being the limited funds for such conversions and part the focus on benefits (nature conservation) that are of primary interest to developed countries. Debt-for-equity swaps have been more successful for private debt but still controversial because of the perception of losing control or sovereignty over domestic assets.

Debt rescheduling provides only temporary relief unless the fundamentals of the economy are changed to promote efficiency, growth, increased export earnings, and reduced public sector deficits. Despite some progress in this regard through structural adjustment programmes the net outflow of resources in many developing and former socialist economies has not been reversed. Potential lenders and donors remain concerned that without fundamental policy reforms they might be throwing good money after bad money.

A way out of this "chicken/egg problem" might be direct debt-relief in exchange for policy reforms. For example, a certain portion of the debt could be retired if the country's government agrees to privatize state enterprises or to reduce energy subsidies that fuel budget deficits. Although such reforms have been linked to debt rescheduling and structural adjustment loans, a more direct debt relief for policy reform might generate triple dividends for sustainable development through: (a) a reduction of the outflow of resources to service the debt (b) an increase in productivity and profitability of old and new investments and (c) an attraction of additional foreign investment.

The question arises as to the source of funds for debt relief in exchange for policy reform. Developed countries would be more effective in inducing policy reform in developing countries if they lead by example. OECD countries are spending US\$240 billion annually to subsidize their agriculture to the economic and environmental detriment of both themselves and the developing countries. The U.S. is spending nearly US\$40 billion annually in direct and indirect energy subsidies, (especially fossil fuels). Thus, developed countries can gradually phase out their own subsidies and policy distortions and use part of the savings to finance debt relief for policy reform in developing countries. Debt relief in exchange for policy reform in developing countries financed from savings resulting from policy reforms in the developed countries, is one of those win-win solutions that can generate billions of dollars in financial resources for Agenda 21 and create, at the same time, conditions for their efficient use.

Environmental Funds

Environmental funds are specialized funds or institutions designed to collect earmarked revenues and disburse them for environmental and conservation purposes. Examples include trust funds, foundations, endowments, revolving funds, green funds, and other grant- or loan-making entities. National environmental funds are a special type of fund which collect and disburse public money in support of national environmental strategy, environmental action plans, or environmental policy. They are usually funded or capitalized from pollution charges, fees and fines, budgetary contributions, debt-for-nature

swaps, contributions from donor agencies. Green funds, on the other hand, are private, social-purpose funds made available by private investors for lending to environmentally sound enterprises and projects.

Environmental funds may be general or specific in scope: at one extreme, they simply provide a supplement to the general environmental (or sustainable development) budget, at the other extreme, they are tied to a single-purpose use. For example in Poland, the National Environmental Fund (NEF), a depository for environmental charges and fines used for wide ranging environmental activities, is a general fund while the privatization escrow funds are tied to particular enterprises and used for the sole purpose of cleaning up past contamination. Funds also might be local (e.g., municipal), national, global, or mixed. The Global Environmental Facility is a global fund, the above mentioned Polish NEF is a national fund while another Polish fund, the Ecofund, created through debt-for-nature swaps, is a mixed fund as it funds national projects of global significance. Funds, in effect, disburse subsidies through grants, grants on interest payments, direct loans, loan guarantees, equity investments, and co-financing with commercial banks, public financial institutions, private enterprises, and NGOs, in order to achieve environmental policy goals.

Environmental funds have both advantages and disadvantages. On the positive side, they combine a diversity of funding sources (public, private, domestic, and international) which provide a degree of independence; they are a source of stable financing and can move funds easily without the bureaucratic constraints of the general budget; they provide a framework for the coordination of donors and the balancing of national and international priorities; they encourage the participation of a wide range of interests (including government, business, local communities, and environmental groups, thereby ensuring public support, transparency, and accountability (Dillenbeek, 1994).

On the negative side, environmental funds are potential sources of inefficiency and distortion and may weaken rather than strengthen environmental ministries. Efficiency requires that public funds are allocated so as to equalize social returns among alternative uses at the margin; this requires flexibility in shifting funds between uses as priorities change. Earmarking limits this flexibility introducing rigidities and inefficiencies in resource allocation as changes in revenue, rather than changes in demand, determine the supply of public services (OECD, 1994). Another danger is the potential bias of fund allocations in favor of supply expansion rather than demand management; in favor of end-of-the-pipe solutions rather than prevention and waste minimization; in favor of capital-intensive solutions rather than policy and behavioral changes.

The stronger argument in favor of environmental funds and earmarking is that environmental taxes and charges are the prices for using environmental services, such as the environment's assimilative capacity and therefore the revenue from these sources should be used to maintain these environmental services rather than for general revenue purposes, as with other taxes (Panayotou, 1994a). A second argument is that environmental funds are a practical application of the polluter-pays principle in which

pollution charges are collected from all polluters and the revenue is then allocated (recycled) to those polluters that are prepared to undertake remedial measures accounting for environmental policy priorities. A third argument in favor of environmental funds is that earmarking enhances the political acceptability of environmental taxes and charges (OECD, 1994).

Environmental funds are of particular relevance to economies in transition because of the underdevelopment of the government budgeting process and of private capital markets. However, care must be taken to clearly define their mandate to avoid crowding out private investments and to phase them out as the restructuring process resolves these transition-related problems. Environmental funds emerged as a major new trend in environmental and conservation finance in the early 1990s. To date, National Environmental Funds have been set up in over 20 developing countries (e.g., Argentina, Mexico, Peru, Philippines, Chile, Thailand, Bolivia, Honduras, Uganda, and others) and in most transition economies in Eastern Europe (e.g., Bulgaria, Czech Republic, Hungary, Poland, and Slovak Republic)

External Development Assistance

Poor developing countries can be given incentives for policy reform in the form of matching funds for domestic resources generated for sustainable development investments through reduction of subsidies and industrial protection, privatization of state enterprises, increased resource rent collection, improved tax administration, or stricter scrutiny of public projects with negative environmental and social impacts.

Multilateral lending institutions, such as the World Bank, attempt to do this through conditionality but this has negative connotations that are resented by some developing countries, which perceive conditionality as a challenge to their sovereignty. Matching funds for policy reform is a positive concept that leverages, or rather, motivates policy reform. The perception would be of a country initiating the reforms and outside funding as an added or supplemental benefit.

Matching funds need not be dollar for dollar. For example, a country that has traditionally been subsidizing fossil fuels is considering the phasing out of these subsidies, thereby saving US\$100 million to be invested in solar energy for rural electrification. The knowledge that another US\$10 million will be made available by a multilateral or bilateral agency in support of such a policy change might increase the chances that such a reform does take place. The US\$10 million of "matching" funds might be regarded as payment for incremental costs justified by the global benefits stemming from reduced greenhouse gas emissions (and hence financed by GEF) or regarded as development assistance for restructuring the energy sector and investing in rural development (financed by bilateral or multilateral development financing sources). Although the source of funds would vary according to the expected beneficiaries, the objective is the same: to motivate an economically and environmentally favorable policy change that would advance sustainable development. The additional resources are not so much the external

matching funds as the domestic funds saved from wasteful use and the higher rates of return to private and public investment generated by the policy reform that the matching funds will have generated.

CHAPTER 5

NEW FINANCING MECHANISMS

Domestic Financial Mechanisms

Private Financing of Environmental Infrastructure

A great deal of environmental problems such as traffic congestion, water pollution, energy brownouts, water shortages, etc., arise from a growing mismatch between private investment and public infrastructure. For example, during the 1980s, investment in the public infrastructure in Thailand grew by less than 3 per cent while private investment grew by over 30 per cent; the result has been growing congestion that has traffic to a standstill and water quality to anaerobic levels, while private investment continues to grow and the environmental infrastructure fails to respond. A similar situation of unsustainable development is observed in cities ranging from Jakarta to Cairo and from Manila to Mexico City. The problem is not just the failure to collect adequate tax revenue or to approve and complete infrastructure projects in time. The problem is one of the underpricing of public services and of disassociation between demand and supply, among those who benefit and those who pay. In principle, private investment and economic growth enlarges the tax base, thereby making more resources available for the public infrastructure. In practice, private investors are able to free ride through a variety of tax exemptions and tax shelters (if not outright tax evasion), while the existing infrastructure, being unpriced or underpriced, suffers from excessive use and poor maintenance.

It is only by directly linking the supply of the public infrastructure to the demand generated by new private (and public) investments that we will be able to assure adequate and timely supply as well as a more efficient use: demand would be lower, supply would be higher, and environmental quality better than what we observe today. Again, this is a form of self-financing – a cost of doing business – consistent with sustainable growth that requires that the full social costs of each activity are paid along the way by those who generate them and therefore have the ability to control them.

The linking of the provision of environmental (and other public) infrastructure and private investment growth can be operationally effected by requiring private investors (and public project programmes) to submit along with their permit application (or request for approval), an estimate of the demand on the public infrastructure and on environmental resources to be generated by their investment (or project). Following approval, payments would be made to a special fund for environmental investments at a level sufficient to maintain the existing (or improved) level of service.

Private Financing of Environmental Protection

Often the state is saddled with huge bills for cleaning up oil spills and contaminated land, for collection and treatment of hazardous waste, for reclamation of abandoned land after mining, for reforestation after logging, and for man-made natural disasters. In fact, a large portion of the financing requirements for Agenda 21 is for restoration of degraded environments, which could have been prevented or paid for by the polluters or beneficiaries of the activities in question. The government can reduce its share of the clean up and restoration bill (and in fact the overall size of the bill) by instituting deposit-refund systems, environmental bonds, bank guarantees for compliance with environmental rules, and presumptive charges based on engineering or statistical output-waste coefficients, etc., with refunds for improved efficiency. Environmental bonds, for instance, ensure that (1) resource extracting companies and potential polluters take adequate measures to minimize the environmental damage caused by their activities, (2) that they effect clean up and restoration of residual damage in the most cost efficient manner, and (3) adequate funds are available for cleaning up waste and the restoration of damaged environments by anyone who fails to comply. Environmental bonds need not be a constraint on economic activity, as they can be invested in interest-bearing accounts or replaced by bank guarantees.

Deposit-refund systems can similarly shift the responsibility for controlling environmental degradation to producers and consumers of polluting products, who are thereby induced to return the by-products of their production and consumption for recycling or treatment and safe disposal, or otherwise to finance their collection and return by others. A great advantage of deposit-refund systems for developing countries is the inducement of a labor-intensive activity (waste collection) in an environment of low-cost, abundant, and underemployed labor. Deposit-refund systems are applicable to a wide range of products and by-products, from beverage containers and packaging, to car batteries and vehicle hulls, to plastics and hazardous materials. In the absence of such deposit-refund systems, the government has to expend scarce government revenues for their waste collection or leave such waste uncollected to litter water bodies and soils, thereby damaging public health and wildlife and harming the country's tourist potential and investment climate.

There are many other ways in which governments can induce the private sector to assume responsibility for waste minimization. For example, industrial associations for specific types of industries (e.g. agrochemicals, sugar mills, palm oil mills, electroplating plants, etc.) or for specific locations (e.g. around a lake, on a river, on a segment of coast, or in an industrial estate) can be given the choice to attain, on their own, a certain ambient level of water or air quality or to be directly regulated or charged by a government regulatory agency. Experience in Germany with factories operating on the Ruhr river, in Thailand with sugar mills on the Tanchin river, and a variety of factories in Japan suggests that a well identified community of industries will choose self-regulation and self-enforcement if they are convinced that they cannot otherwise evade environmental regulations. Induced self-regulation is more efficient and cost effective than direct government regulation because industries know best how to control their own

waste, because self-enforcement is induced by the desire to be accepted by other members of the association and by the community, and because the cost of policing and monitoring are significantly reduced and assumed directly by the source. Again, the funds needed for environmental clean up and enforcement of environmental regulations are reduced and generated from among the members of the industrial association in a manner that alters behavior and the way of doing business, the only sustainable approach to higher growth with less destruction. The government need only monitor ambient quality and impose charges on the association for non-compliance or wave the "threat" of direct regulation. This approach may not work in all situations but it will work in a sufficient number of cases to achieve a substantial reduction in the level of public funding necessary to promote sustainable industrial development.

An alternative approach is the establishment of Industrial Environmental Funds through presumptive charges on industries according to expected waste generation and the use of such funds for environmental clean ups carried out by the private sector on a competitive basis. Combined with environmental auditing by accredited auditors and rebates (or surcharges) for better (or worse) than average performance, such funds can serve as financing vehicles of sustainable development. Indeed, such a scheme was proposed by the Thailand Development Research Institute and adopted by the Thai Government, although the incentive structure was subsequently diluted with a substantial government contribution to the fund without a clear provision for matching funds by industry and eventual phasing out of government funds (Panayotou, 1993b).

Betterment Charges as a Financing Mechanism

Many environmental improvements generate in addition to public goods, private values in the form of capital gains or property value appreciation. For example, environmental clean-ups of neighborhoods, rehabilitation of urban slums, establishment of parks, new road infrastructure, and industrial relocation raise the value of properties in the area and in adjacent areas. Part of this property appreciation can be captured through a variety of mechanisms such as betterment charges, impact fees, property taxes, land redevelopment schemes, etc., and the proceeds used to finance the necessary investments. Yet, in many countries, developed and developing, environmental investments are financed from general taxation while the direct beneficiaries enjoy windfalls or capital gains created by public investments. This is clearly neither efficient nor equitable, and results in too few environmental investments being undertaken. Studies show that most industrial relocation projects, rural roads in the vicinity of towns, urban parks, and slum upgrading projects can more than pay for themselves by extracting part of the appreciation of positively affected properties.

As an example, consider the Beira Lake in the center of Colombo, Sri Lanka. What was an environmental asset in earlier times, and could be a tourist attraction today, is a major pollution site from the effluents of industries located around the lake. The need for relocation of industries outside Colombo is well recognized but the financial resources needed are lagging. Yet, the relocation itself would generate more than sufficient

resources in terms of increased property values — both on site (as industrial land is turned into residential or commercial real estate) and in the periphery (as low cost housing is turned into high value housing) — to not only finance relocation but also to leave local residents and the tourist industry substantially better off. The challenge is to devise a mechanism whereby part of this potential (or the beneficiaries “willingness to pay” to bring them about) is captured to finance relocation. Betterment charges are one such instrument. Another instrument is reevaluation of properties for property taxation following improvements. Even without a change in the tax rate the higher property values will give rise to larger tax revenues that can partly or wholly finance relocation of industries. In this particular case the appreciation of the land (much of it waterfront) on which industry is located might be sufficient to finance relocation without the need for betterment charges on other beneficiaries.

An interesting instrument for self-financing local road construction from property-value appreciation is the land redevelopment scheme used in South Korea. Land owners in the affected area relinquish control of their properties to the road construction authority, which builds the road through the most advantageous route and then returns to the landowners a smaller — but more valuable — piece of land than they surrendered. The authority retains a certain percentage of the land, which it sells to finance the construction of the road. In this manner road construction is self-financed and both the affected landowners and the general public benefit (the former through a higher value property and the latter through lower taxes).

These are just a few examples of a vast, but largely untapped, source of both funds and incentives for sustainable development. Public investments create rents, and rents can be skimmed off — without distortion — to finance further investments in sustainable development.

Global Financing Mechanisms

Since sustainable development has global dimensions that largely benefit the developed countries of the North but require actions by the South, a case can be made for international transfers from North to South to underwrite the costs of conserving resources of global significance which may otherwise be irreversibly lost. The demand for conservation of tropical forests, preservation of biodiversity, reduction of greenhouse gas emissions and protection of the ozone emanates mainly from the developed countries which have sufficiently high incomes and low discount rates to be concerned with environmental amenities and distant threats to their living standards. Presumably, this demand is not a claim on other people’s resources but an effective demand matched by willingness (and ability) to pay the opportunity costs. Yet, we have no estimates of the global willingness to pay for the conservation of what have been called the “global commons” with little recognition of the disparate sources of demand and supply. Part of the willingness to pay surfaces in contributions to environmental organizations, in debt-for-nature swaps, and in state contributions to the Global Environmental Facility. However, these modest contributions are a far cry from the pronouncements at

international fora such as the UNCED Conference in Rio and in official UN documents such as Agenda 21, to which world leaders have subscribed.

While developed country willingness to pay for the conservation of "global commons" is unlikely to match their pronouncements and wish lists, it must certainly be larger than what we have observed in official and unofficial contributions, which are undoubtedly constrained by the lack of appropriate charge and collections mechanisms. First, however, there is a need to measure people's willingness to pay for the conservation of different resources (biodiversity, tropical forests, ozone, climate) and a need to devise appropriate mechanisms to tap it and use it effectively. Actually, people's willingness to pay for conservation is not independent of the collection mechanism (or vehicle of payment) and the transparency and effectiveness of the use of the funds. If we assume an average willingness to pay of 0.3 per cent of per capita incomes in the developed world, an amount of US\$50 billion a year should be within reach.

In the absence of global government with taxation power, developed countries' willingness to pay for conservation could be captured through new innovative trading arrangements between developed and developing countries. Developing countries need financial resources and efficient technology to pursue sustainable development. In exchange they have to offer:

- a) unmatched biological diversity which can be preserved only in situ;
- b) forests that are of global significance, in terms of their impact on global climate and atmospheric balance;
- c) environmental amenities that include wildlife and other natural assets of recreational, educational, and scientific value; and
- d) lowest-cost reductions of carbon emission

The South could offer to trade environmental conservation for financial and technological resources on behalf of the global community. It has a comparative advantage to do so because protection and maintenance of natural resources is labor-intensive and requires proximity and intimate knowledge of the resource, as well as interest in preserving national sovereignty.

However, how are such trading arrangements actually to be effected? While there is a well-developed market for financial and technological resources there is no such market for the conservation of natural and biological resources. This is due to the nature of these resources (global externalities), the lack of well defined (and fully recognized) property rights and the difficulty of enforcing contracts across borders in the absence of a "global authority" that supersedes national sovereignty. Moreover, the object of conservation and exchange is difficult to define and monitor. Despite these difficulties, some exchanges of this nature have taken place. Examples include debt-for-nature swaps,

the Global Environmental Facility, the prospecting rights purchased by the Merck Pharmaceutical Company in Costa Rica and the EcoFund in Poland created through debt conversion. However, as these exchanges circumvent rather than enhance the market, they remain more the exception than the rule. There is a need for mechanisms for trading conservation for development through the market in the same way that other goods and services are being traded.

Several innovative mechanisms have been recently proposed and some are being experimented with. They include internationally tradeable carbon emission permits, carbon taxes, carbon offsets, transferable development rights, biodiversity patents, prospecting concessions and matching funds for policy reforms, and incremental cost financing from the Global Environmental Facility. Joint biodiversity/biotechnology research offers a unique opportunity for North-South technology cooperation through joint implementation. Tradeable emission permits could potentially effect voluntary and mutually beneficial transfers of financial resources and technology from the North to South, advancing development in the South and protection of the global environment.

Carbon Offsets

This is a special type of joint implementation by a developed country power utility and a developing country forest company or Forestry Department. Under this type of compact the power utility finances a shift to reduced impact logging techniques and enrichment planting forest protection or reforestation in a developing country in exchange for credit for the carbon saved or sequestered by the funded forestry activity. The potential benefits are substantial (arising from differential costs of CO₂ reductions between developed and developing countries) and shared between the parties involved (both private and public). While several such pilot offsets have been initiated in recent years (e.g. New England Electrical System with the Sabah Foundation; Applied Energy Systems of Virginia with Guatemala), carbon offsets have not yet been sanctioned by governments and the global community as legitimate means of meeting CO₂ reduction obligations under the Climate Convention. Despite criticism of this and other joint implementation mechanisms there is sufficient interest by both North and South to warrant further study and experimentation. Carbon offsets is one mechanism through which the global value of carbon sequestrations can be internalized to the local populations of developing countries.

Internationally Tradable Emission Permits

The virtually unlimited opportunities for low-cost reduction of greenhouse gas emissions are another grossly undervalued resource. This resource is potentially high demand in the North and the South has a comparative advantage to supply it in exchange for financial and technological resources. While reductions of CO₂ emissions from fossil fuel consumption in Japan and the EEC might cost over US\$100 per ton, in developing countries such as India and China, they would cost under US\$10 per ton. If CO₂ emission reduction was a conventional commodity there would be no doubt as to where developed countries would seek to obtain these supplies. Today, two obstacles stand in

the way of emissions reduction trading. First, there is no binding obligation on countries to contain their emissions. The climate convention could change that, especially if amended to set an aggregate ceiling on greenhouse gas emissions, allocated among countries according to population size or a combination of population size and some other variable such as GDP, or historical level of emissions. Any allocation mechanism that has any chance of being accepted by the South would result in excess demand for emission permits by the developed countries and excess supply by the developing countries setting up the stage for emissions trading. Even if allowable emissions are frozen at historical levels, growth would generate demand for additional emission permits which could be more easily obtained from developing countries through improved energy efficiency than from developed countries such as Japan or Germany where further improvements in efficiency or reductions in emissions could be obtained only at high costs. Allowing emissions trading across nations would ensure a given reduction of emissions at the lowest possible cost and also encourage technology transfer and flow of financial resources from North to South in the interest of the protection of global climate and of sustainable development. For most developing countries, tradable emissions would be a major source of financial inflows and technology transfers and a strong incentive to become more efficient to save emission permits for sale to other countries or for their own industrial expansion.

International Forest Compacts

These are voluntary obligations (commitments) drawn and undertaken by individual developing countries with the support of developed countries to engage in policy reforms, conservation and investment programs that would achieve specified targets of forest preservation and sustainable management over a specified period of time in exchange for transfer of financial and technology resources from developed countries in support of these reforms. The participating countries, could in turn be given credit against CO₂ reduction and forest protection obligations undertaken under international conventions.

Internationally Transferable Development Rights

Tropical countries could set aside habitats for biodiversity conservation and divide each habitat into a number of Transferable Development Rights (TDRs) corresponding to an area unit, say, a hectare. Each TDR would state the location, condition, diversity, and a degree of protection of the habitat and any special rights that it conveys to the buyer/holder. TDRs could then be offered for sale both locally and internationally at an initial offer price that covers fully the opportunity cost of the corresponding land unit (i.e. the net present value of the income stream of the foregone development opportunity). It is preferable to start at a relatively high price to test the market, since undervaluation is irreversible (following sale) while overvaluation is reversible (following non-sale). If the price turns out to be too low to clear the market, i.e. to exhaust the supplied TDRs for a particular habitat, the price could be lowered to attract additional demand or the quality of the TDR can be enhanced by enlarging the area to include additional

biodiversity values or by improving its protection and management.

The potential buyers of TDRs include local and international organizations, local and international foundations and corporations developed country governments, chemical and pharmaceutical companies, scientific societies, universities and research institutions, even individuals in developed countries who are environmentally minded. The motivation for purchasing TDRs would naturally vary among prospective buyers. Some may have direct use values such as prospecting for new chemicals or pharmaceuticals. Others may be expressing their non-use values through the purchase of TDRs. Yet others might buy and hold TDRs if they expect them to rise in value as a result of decreasing supply and increasing demand due to population and income growth or change in tastes and increase in environmental awareness. Certainly every new discovery of a valuable new species, or even a new use of existing species found in a particular habitat would include the value of the TDRs of that site.

One way developed countries can stimulate the demand for TDRs is providing credits to domestic firms and property owners for the acquisition of TDRs from developing countries against domestic environmental regulations such as building codes, forest harvesting and replanting regulations, environmental emission standards, CO₂ emissions, etc. A criticism of this method of stimulating the demands for TDRs might be that the conservation of biodiversity in the tropics would have been accomplished at the expense of the domestic environment in the developed countries. One way around this problem is to tighten environmental regulations from current levels and then provide offset credits for buyers and holders of TDRs. Another method is by introducing a conservation tax and then allowing people the option to pay this annual tax or purchase and hold TDRs from conservation in lieu of the tax. The great advantage of this financing mechanism for the conservation of tropical forests and biodiversity is that it makes the opportunity costs clear and provides a vehicle for the beneficiaries to pay them (Panayotou, 1994b).

Biodiversity Prospective Concessions

Biodiversity or genetic prospecting is the search for naturally occurring biochemical compounds with commercial values in pharmaceutical, agricultural, and industrial applications. The biologically rich but financially and technologically poor South has the potential to access both financial and technological resources from the wealthy but gene-poor North through genetic or biodiversity prospecting concessions. Many countries have begun to commercialize their genetic resources through such agreements. Reid, et. al. (1993) lists over 20 research organizations actively engaged in genetic prospecting. The best known and most innovative arrangement is that between Costa Rica (INBio) and the Merck and Company pharmaceutical firm under which Merck paid over US\$1 million up front as a concession fee and promised royalties for any commercially valuable discoveries. Of the US\$1 million payment, US\$100,000 is intended for conservation activities. Other such deals include ones between the British firm Biotics Limited with Ghana and Malaysia, and the U.S. National Cancer Institute with Madagascar, Tanzania, and Zimbabwe (Simpson, et. al., 1993). The same source reports a US\$5 million transfer

of research and technology projects from MIT to the Brazilian Amazon. Another source (Laird, 1993) reports payments of US\$50 to 200 per kilogram for national samples.

Biodiversity prospecting could become a major source of conservation in the case of pharmaceuticals or other discoveries, provided that contracts are structured to include royalty payments or profit sharing arrangements and that a specified share of the revenue is devoted to conservation activities.

CHAPTER 6

SUMMARY AND CONCLUSIONS

The concept of sustainable development has received unprecedented world-wide acceptance among world leaders, policy makers, scientists, the business community and common people across geographic regions, levels of development, cultures and disciplines. Yet the resources necessary for its attainment do not match or even come close to the ambitious pronouncements. In terms of additional "financial resources", less than one per cent of the estimated "needs" have been made available since the Rio Conference. In terms of domestic financing of sustainable development, the gap between financial "needs" and "available resources" is even greater. When sustainable development, like any other project or endeavor, is defined independently of the resources needed for its attainment, its financing looms insurmountable. The need for funds is unlimited, the sources scarce. For sustainable development on a global scale, the problem is even more difficult for there can be no injection of resources from outside; all resources must be found from within the world economy. The pronouncements and programmes of Agenda 21, though individually reasonable and compelling, when taken together and without a reference to sources of financing, appear little more than a wish list of good things that are beyond our reach. But unlike most wish lists, sustainable development and the strategies and programmes of Agenda 21 are neither luxuries nor options; they are imperatives of growing importance and urgency.

In order to identify funding sources and financing mechanisms for Agenda 21 we converted the definition of sustainable development into economic terms. Sustainable development is development that pays its *full* cost along the way; when it depletes resources it charges itself a user cost; when it despoils the environment it charges itself an environmental cost that fully covers the damage (at the margin); it receives no subsidies except in proportion to positive externalities that it generates. It is only by inextricably internalizing the conservation of resources, the protection of the environment and the provision of environmental and social infrastructure to the very economic activities and actions that place additional demands on these resources (i.e. the users, the beneficiaries and the polluters) that genuine development can be attained and sustained.

Based on this operational definition of sustainable development, which is fully consistent with the original definition of the Brundtland Commission, we identified several major sources and mechanisms for financing sustainable development in general, and Agenda 21 in particular. Virtually all sources are indigenous and have both an "incentive" and a "financing" effect (see Appendix, Table 1). The incentive effect promotes efficiency and growth, minimization of waste and conservation of resources, drawing the economy (both national and global) closer to the sustainable path. This incentive effect may be called the implicit financing of sustainable development. The explicit financing comes from: savings in public expenditures (e.g. by reducing subsidies); from generation of additional tax revenues (e.g. by broadening the tax base, or fuller extraction of resource rents); from fuller cost recovery for public services; and from earnings from expanded trading

opportunities (see win-win region of Figure 2). These funds become available for additional investments in economic growth, poverty alleviation, resource conservation and environmental protection to bring the economy even closer to sustainable development (see trade off region of Figure 2).

These approaches to financing Agenda 21 and the identified specific sources and mechanisms have several advantages:

- a) they are fully integrated with the concept of sustainable development;
- b) they are based on the polluter/user/beneficiary pays principle which is accepted worldwide;
- c) they are cost-effective aiming to achieve a given improvement at the minimum possible cost;
- d) they are flexible and dynamic, adjusting to changing conditions; and
- e) they are sustainable because they are indigenous or based on trade principles, not on charity.

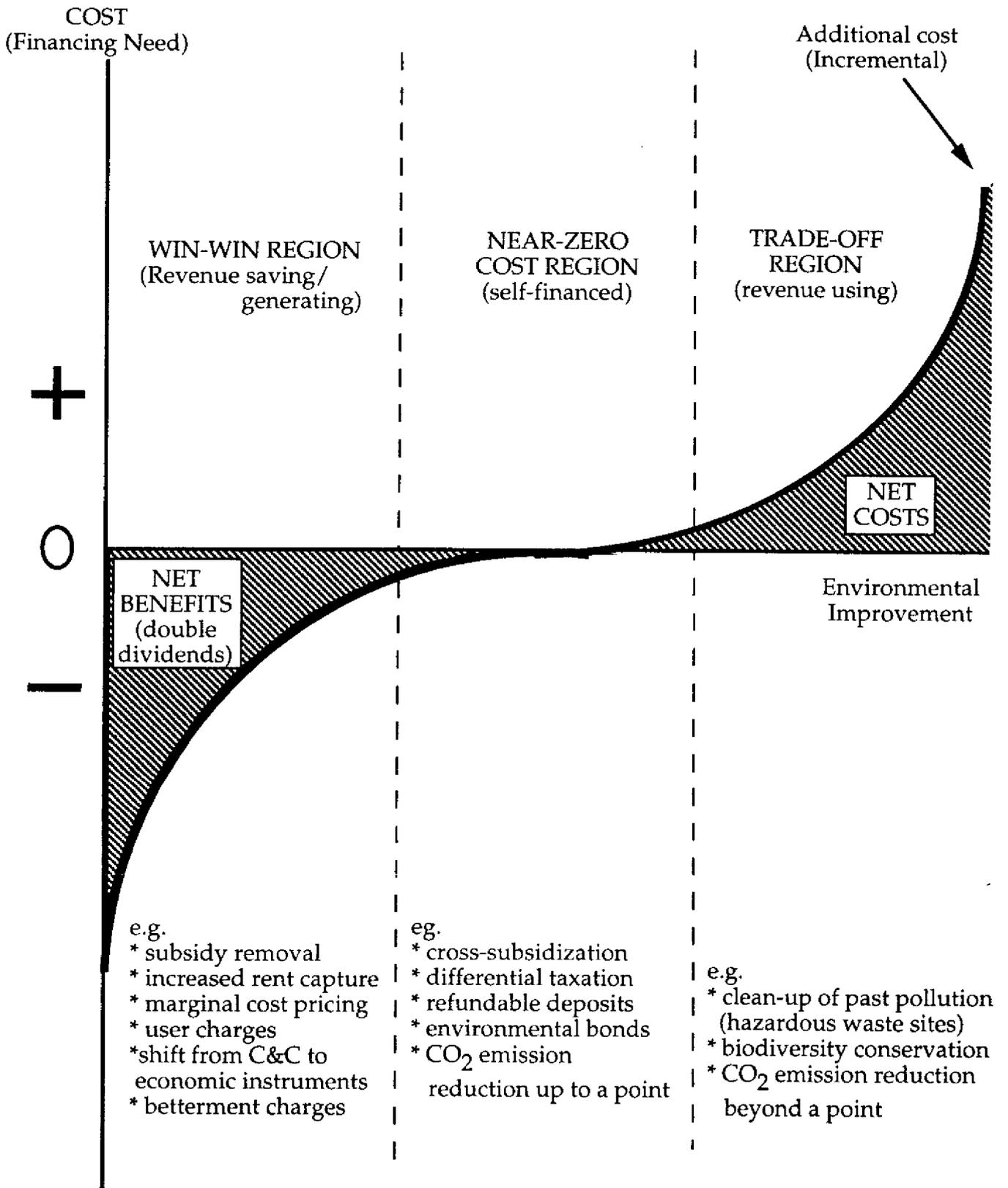
Since the proposed financing mechanisms are fully integrated with the concept of sustainable development, the extent of their use can also serve as an indicator (or a scorecard) of progress towards sustainable development. They could be used by individual nations, development assistance agencies, private environmental groups and the recently established Sustainable Development Commission as well as by UNEP and UNDP to monitor progress towards the objectives of Agenda 21. Here are a few such indicators:

- reduction of environmentally and economically harmful energy, chemical and capital subsidies;
- increased taxation of national resource rents especially stumpage values from timber production;
- progress towards full-cost pricing of natural resources and utilities;
- increased cost recovery from public projects and services;
- shift of emphasis from supply expansion to demand management and from construction to operations and maintenance;
- increased budget allocations to the education and employment of women;
- progress towards self-financing of urban infrastructure, environmental improvements and industrial relocation;
- privatization of state enterprises and competitive provision of public services;

- progress towards establishing secure property rights over land, water, forest and other natural resources currently under insecure tenure or open access;
- progress towards fiscal reform that would replace some of the conventional taxes by environmental taxes;
- cross-subsidization of environmentally beneficial activities by environmentally harmful activities;
- progress towards devolution of administrative, regulatory and tax authority to representative local government;
- increased introduction and reliance on economic instruments as complements to or substitutes for rigid command and control regulations;
- efforts to assess and tap the willingness to pay of local and global beneficiaries of environmental protection and nature conservation.

Clearly, some of the proposed financing sources and mechanisms are not immediately available, while others face political economy constraints, opposition by vested interests, difficult trade-offs and the counterforce of inertia. These may have to wait for more catalysis, but efforts to effect such catalysis could and should begin today. Others are readily available, win-win economic reforms or policy changes that can be gradually phased in with minimal resistance. The costs of not doing so is high and growing. The first priority is to stop the national and global economies from straying further afield from the efficient and sustainable development path, and to begin to move them in the right direction. Each country, no matter how poor, has within it the resources and the capacity to attain sustainable development in the long run. It is, however, short-term pressures that make the long run a moving target. Domestic policy reforms leveraged and supported by external financial assistance are critical for breaking the vicious circle of unsustainable development. Beyond this crucial starting point lies a rich menu of sources of funding and financial mechanisms, both private and public, that can be tapped to finance the convergence to sustainable development. We have highlighted several good sources but many more remain to be explored.

Figure 2. Financing Mechanisms for Environmental Improvements and Sustainable Development



APPENDIX. TABLE 1: **SELECTED SOURCES OF FUND SAVINGS AND
ADDITIONAL FINANCIAL RESOURCES**
(Summary Table)

FINANCING INSTRUMENTS	CURRENTLY	POTENTIALLY
TAXATION SYSTEM	Distortionary - taxes work, savings, value - reduces tax base - increases expenditures	Corrective - taxes leisure, consumption, pollution - expands resource base - reduces expenditures
SUBSIDIES	Widespread and Distortionary - drain on the budget - promote environmental degradation, resource depletion - increase financing needs	Limited and Targeted - internalize positive externalities - cushion poor (equity) - technology development Removal of distortionary subsidies - saves budgetary resource - increase tax base - improves resource allocation - reduces inequities
PRICING OF UTILITIES AND PUBLIC SERVICES (user charges)	Underpricing - costs not recovered - deficits burden state budget - wasteful use of natural resources - excessive environment damage - raises financing needs for supply expansion - necessitates defensive and mitigatory expenditures	Full-Cost Pricing (marginal cost pricing) including depletion and environmental damage cost - cost recovery (unless $MC < AC$) - financial surplus (when $MC > AC$) - reduce need for defensive expenditures - resource conservation - budgetary savings
NATURAL RESOURCE PRICING AND TAXATION	Underpricing - excessive depletion - environmental damage - reduced funding for resource management and regeneration Inadequate rent capture - loss of potentially large financial resources - inequity	Secure (land rights) - increased land values - increase investment in land improvement and soil conservation - increased access to capital markets - increased tax base - increased revenues from property taxes - revenues from capital gains taxes

FINANCING INSTRUMENTS	CURRENTLY	POTENTIALLY
<p>NATURAL RESOURCE OWNERSHIP (fisheries, forests, pastures, minerals, construction materials)</p>	<p>Open-Access</p> <ul style="list-style-type: none"> - excessive depletion - environmental damage - underpricing - rent dissipation - no royalties/minimal tax collection 	<p>Secure Property Rights</p> <ul style="list-style-type: none"> - reduced depletion - reduced environmental damage - inclusion of user cost in resource pricing - rent maximization - increased government revenue from royalties and taxes
<p>LAND OWNERSHIP/ TENURE</p>	<p>Insecure (in many cases)</p> <ul style="list-style-type: none"> - depressed land values - underinvestment in land improvement and soil conservation - restricted access to capital markets - limited tax base - meagre or zero revenues from property taxes 	<p>Secure (land rights)</p> <ul style="list-style-type: none"> - increased land values - increased investment in land improvement and soil conservation - increased access to capital markets - increased tax base - increased revenues from property taxes - revenues from capital gains taxes
<p>FOREST CONCESSIONS</p>	<p>Too Short/Renewal Uncertain</p> <ul style="list-style-type: none"> - rapid depletion - excessive logging damage - unsustainable tax base <p>Individually negotiated (often "sweetheart deals")</p> <ul style="list-style-type: none"> - minimal rent capture - inefficient logging operators <p>Management obligations not complied with</p> <p>Governments expend funds to build logging roads</p>	<p>Longer/Renewal Tied to Performance</p> <ul style="list-style-type: none"> - sustainable use - reduced logging damage - sustainable tax base <p>Competitive Bidding (auction or seal tender)</p> <ul style="list-style-type: none"> - maximal rent capture - efficient forest management firms <p>Environmental Bonds ensure compliance</p> <p>Deforestation Tax generates budget revenues/limit forest cleaning, logging road construction</p>
<p>WATER RIGHTS AND WATER PRICING</p>	<p>Water Rights Absent/Water Pricing Limited</p> <ul style="list-style-type: none"> - wasteful use of water - water shortages - funds needed for supply expansion - subsidies needed to maintain the system - system and watersheds deteriorate due to lack of funds 	<p>Water Rights Introduced/Water Pricing Instituted</p> <ul style="list-style-type: none"> - improved water use efficiency - water shortages lessen - need for supply expansion lessen or postponed reducing fund needs - funds generated from water charges or water right taxes and capital gains taxes.

FINANCING INSTRUMENTS	CURRENTLY	POTENTIALLY
<p>POLLUTION CHARGES AND FINES</p>	<p>Absent or minimal -charges too low to act as incentives -fines too low to induce compliance Eroded by inflation Over-reliance on costly command and control regulations -end-of-the-pipe clean ups -mandated technology</p>	<p>Corrective of distortions High and rising over time Cost-effective Provides incentives for behavioral change Reduced financing needs Indexed to inflation Increased revenues Fines high enough to induce compliance</p>
<p>BETTERMENT CHARGES AND IMPACT FEES</p>	<p>Generally absent or minimal public investment bestows untaxed private capital gains and windfalls. Underfunding of public infrastructure and environmental improvements. Demand for supply expansion; underemphasis of demand management. Lobbying for influence over location of public investments.</p>	<p>Major source of funds for public infrastructure and environmental improvements. Reduced incentives for distorting allocation of public funds. Potential for self-financing of industrial relocation, environmental clean ups and certain transport projects.</p>
<p>BIODIVERSITY PROSPECTING CONCESSIONS</p>	<p>Limited to a few countries Forgone potential revenue Underfunding of biodiversity conservation Limited incentive for biodiversity protection</p>	<p>Financial resources -concession fees -royalties -profit sharing Conservation financing Technology transfer Incentive for conservation</p>

SOURCES OF FUND SAVINGS (page 4)

FINANCING INSTRUMENTS	CURRENTLY	POTENTIALLY
<p>TRANSFERABLE DEVELOPMENT RIGHTS (or TRADEABLE CONSERVATION SERVICES)</p>	<p>Developing countries provide biodiversity conservation services to the global community free of charge.</p> <p>Developing countries lack financial resources (and incentives) to protect their rich biological resources.</p> <ul style="list-style-type: none"> -conversion of habitats to inferior and unsustainable uses -loss of local benefits from habitat protection 	<p>Major source of funding of conservation and sustainable development without compromising sovereignty over biological resources.</p> <p>Enhanced local environmental benefits (joint products of habitat conservation)</p> <p>Payment for services already provided by developing countries</p> <p>Enhanced incentives for conservation</p> <p>Sustainable land uses</p>
<p>CARBON OFFSETS</p>	<p>Limited but growing</p> <p>Facing opposition</p> <ul style="list-style-type: none"> -from some developing and developed countries -from some environmental groups <p>Unexploited sources of low-cost carbon emission reductions and carbon sinks.</p> <p>Developing countries forego</p> <ul style="list-style-type: none"> -potentially large transfers of financial resources -technology transfer 	<p>Major source of external funds for</p> <ul style="list-style-type: none"> -improved energy efficiency -forest protection -reforestation -solving local environmental problems <p>Can be structured to be fair and very beneficial to developing countries by providing</p> <ul style="list-style-type: none"> -financial resources -technology transfer -credit against future CO₂ reduction obligations in developing countries
<p>INTERNATIONALLY TRADEABLE CO₂ EMISSION PERMITS</p>	<p>Low energy efficiency</p> <p>Underfunding of environmental and conservation investments</p> <p>Outdated technology</p> <p>Limited success and high costs of reducing CO₂ emissions by developed countries under the Global Climate Convention</p>	<p>Transfer of substantial financial resources to developing countries</p> <p>Technology transfer</p> <p>Enhanced energy efficiency</p> <p>Reduction of local environmental problems (joint products)</p> <p>Faster and lower-cost attainment of Global Climate Convention targets.</p>

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