USING ECONOMIC INCENTIVES FOR BIODIVERSITY CONSERVATION

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1. INTRODUCTION: THE USE OF ECONOMIC INCENTIVES FOR BIODIVERSITY CONSERVATION

Incentive measures have long been used by governments to manipulate the ways in which macro and sectoral economies work. It is however only relatively recently that they have started to be applied to biodiversity conservation. An incentive for biodiversity conservation can be defined as[i]: "*A specific inducement designed and implemented to influence government bodies, business, non-governmental organisations, or local people to conserve biological diversity or to use its components in a sustainable manner. Incentive measures usually take the form of a new policy, law or economic or social programme.*"

The basic aim of setting in place economic incentives for biodiversity conservation is to influence people's behaviour by making it more desirable for them to conserve, rather than to degrade or deplete, biodiversity in the course of their economic activities. ***This paper is concerned with the use of economic incentives for biodiversity conservation.***

The reason that it is necessary to take steps to ensure that economic incentives for biodiversity conservation exist is that, currently, governments, industries, private sector and households under-value, over-consume and under-conserve biodiversity as they produce and consume. These groups all degrade biodiversity in the course of their economic activities. If biodiversity is to be conserved, there is a need to change their behaviour and to replace or modify the economic activities that give rise to biodiversity degradation and loss. ***This paper describes the types of economic activities that lead to biodiversity degradation and loss.***

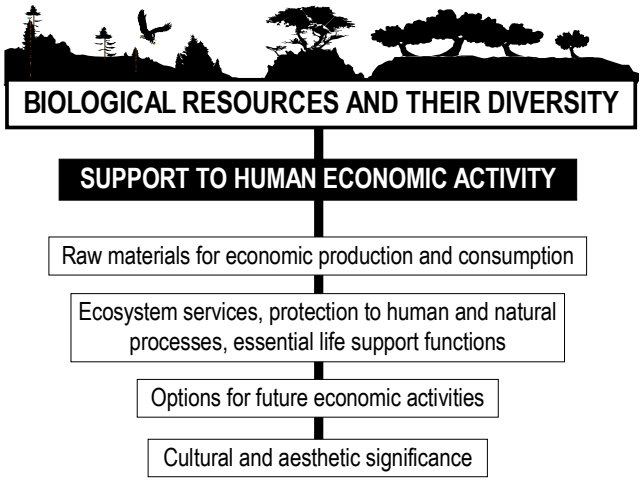
In turn, people carry out economic activities in ways, and at levels, that harm biodiversity because it is economically attractive or profitable for them to do so. A wide range of failures and distortions in the ways in which markets, institutions and policies work cause this to occur, because they send people the wrong signals about the value, use and management of biodiversity. There is a need both to identify and to overcome these broader economic forces that lead to biodiversity loss, and at the same time to set in place positive economic incentives for biodiversity conservation. ***This paper describes the underlying or root economic causes of biodiversity degradation and loss and highlights cases where there is a need to overcome them, and to set in place economic incentives for biodiversity conservation.***

Economic incentives for biodiversity conservation can take various forms. Which incentives are likely to be the most effective or appropriate in a given case depends on a wide range of factors, including social and political determinants as well as economic characteristics. Economic incentives for biodiversity conservation must be chosen carefully so as to respond to the specific circumstances of different groups and economic activities at the same time as they address the causes of biodiversity loss, and to. ***This paper identifies the different categories and types of economic incentives that can be used for biodiversity conservation, and illustrates them with real-world examples. It aims to stimulate discussion and thought about how economic incentives can be used for biodiversity conservation.***

2. IDENTIFYING THE NEED FOR ECONOMIC INCENTIVES FOR BIODIVERSITY CONSERVATION

Biological resources, ecosystems and their diversity form the basis of human economic systems (Figure 1). Biological resources provide raw materials that are used as inputs into domestic and commercial processes and yield income, subsistence and employment. Ecological functions such as pollution regulation, climate control, land and water catchment protection enable economic production and consumption because they protect natural and human resources through providing a sink for wastes and residues and maintain essential life support functions. The presence of a pool of biological and genetic resources supports economic growth and diversification through maintaining the option of carrying out economic activities in the future, some of which may not be known now. Finally, biodiversity contributes to the quality of life because it yields aesthetic pleasure and holds cultural significance for many different people. All of these biodiversity benefits have a high economic value.

Figure 1: The economic importance of biodiversity



This high economic value provides the basic rationale and justification for conserving biodiversity. The fact that biodiversity is being degraded, and that this loss undermines the value of human economic activities, means that it is necessary to set in place a system of incentive measures that will induce people to conserve, rather than to degrade, biodiversity. It means that it is necessary to change the ways in which economic production and consumption takes place, and to change the economic signals which determine economic activities to take place in ways that are destructive to biodiversity. A first step in the use of economic incentives is to identify and understand these activities and forces which comprise the economic causes of biodiversity loss. ***The paragraphs below look at the economic causes of biodiversity degradation and loss that necessitate the use of incentive measures.***

2.1. The direct economic causes of biodiversity loss

Almost all forms of human production and consumption have the potential to impact on biodiversity. Economic activities directly cause biodiversity loss when they deplete, convert, pollute or otherwise degrade biological resources and ecosystems. For example over-grazing, over-fishing, conversion of forests and wetlands to agriculture, and the unsustainable exploitation of plants and animal products all lead to biodiversity loss because they use up renewable biological resources at a rate greater than that at which they can naturally regenerate, or because they replace natural ecosystems with other land uses which do not support a diverse base of natural species. Other activities such as the use of destructive fishing or timber harvesting techniques, slash and burn agriculture, open pit mining or the disposal of untreated agricultural, industrial and domestic wastes into land and water degrade biodiversity as a secondary effect of the technologies and methods they employ – they affect environmental quality, and thereby impact on biodiversity.

In summary, it is possible to identify three major direct economic causes of biodiversity degradation and loss:

- The ***unsustainable utilisation of biological resources*** and the consequent decline in their availability or diversity. This includes activities which are unsustainable overall, or in terms of the areas and species they harvest. Any activity which harvests resources at a quantity or rate greater than that at which they naturally regenerate or are replaced, and leads to a decline in their quantity, quality or diversity over time, can be said to be unsustainable;
- The ***conversion, modification and fragmentation of natural ecosystems*** to other uses which do not maintain a diverse pool of natural species or which undermine the provision of vital ecological functions. This includes land uses which lead to permanent changes in habitats by destroying and replacing natural ecosystems and their component species. Examples include the conversion of natural ecosystems to agriculture, mariculture, settlement or mining;
- The ***use of destructive harvesting or production techniques*** which impact negatively on biodiversity. This includes land and resource uses which waste or destroy non-target species in the course of their activities. Examples include the use of destructive fishing or timber harvesting techniques, slash and burn agriculture or the unselective exploitation of wild species;
- The ***alteration of environmental quality and functions*** that are required to maintain biodiversity and ecosystems. This includes production and consumption activities which generate wastes or by-products which harm the natural resource base. Examples include untreated domestic waste, the use of hazardous or toxic chemicals or the disposal of industrial effluents or by-products into land, air and water.

Where economic activities are causing biodiversity degradation directly, as outlined above, there is a need to use incentive measures to reduce the levels or change the ways in which these activities are carried out.

2.2. The underlying economic causes of biodiversity loss

People do not degrade biodiversity for no reason. They do so because their situation and circumstances provoke – and sometimes even force – them to do so. Economic activities that lead to biodiversity degradation are permitted, or even encouraged, to take place because of failures and distortions in the markets, laws, policies and institutions that govern production,

consumption and biological resource use. These failures and distortions make it seem more profitable, or economically attractive, to degrade biodiversity in the course of economic activities. They comprise the underlying economic causes of biodiversity degradation and loss – they are ***perverse incentives*** that encourage people to degrade biodiversity, or they provide ***disincentives*** that discourage biodiversity conservation.

In summary, it is possible to identify four major categories of perverse incentives or disincentives that comprise the underlying economic causes of biodiversity loss:

- ***Policy and legal failures:*** Governments set in place policies to stimulate economic activity and to meet particular national or sectoral goals. Laws aim to regulate people's behaviour so as to achieve these economic goals or to conform to particular social or moral norms. Policies and laws are usually accompanied by a range of supportive instruments such as subsidies, taxes, fines, education, research and extension. Such policy instruments often encourage people to degrade biodiversity in the course of their economic activities, either because they directly stimulate activities that lead to biodiversity loss, because they fail to contain or enforce checks against biodiversity degradation, or because they omit consideration of biodiversity. Examples include agricultural policies which encourage high-input arable production as the only legitimate use of land, industrial and urban policies which encourage development and settlement in ecologically sensitive areas or contain inadequate consideration of waste management and pollution control, and environmental sector policies which fail to consider issues of resource management, use and tenure;
- ***Market failures:*** Markets, through the price mechanism, allocate resources and co-ordinate people's decisions about the quantity of goods that they produce and consume. People's economic activities respond to the markets and prices that they face, because these influence the relative profitability and desirability of different production and consumption options. Prices and markets are however frequently imperfect, and send the wrong signals about the value of biodiversity-based goods and services. Often the price of unsustainably-exploited biological resources, or of products or technologies that degrade biodiversity, are more attractive than those of sustainably-harvested or biodiversity-conserving technologies and products. Sometimes there is no market at all for biodiversity goods and services, or people are unable to access these markets. This in turn encourages people to under-value, over-consume and under-conserve biodiversity. Examples include the setting of natural resource utilisation fees and royalties at zero or low prices, the monopolisation of local resource markets by parastatals or middlemen, artificially low prices for industrial and agricultural chemicals, low fines and penalties for environmental degradation or the complete absence of prices and markets for many environmental services and biodiversity-conserving goods and services;

- ***Institutional failures:*** Institutions set and control the terms and conditions under which economic activities, biodiversity and other resources and factors of production are managed, allocated and used. Local, national and international institutions often encourage biodiversity loss, or fail to provide incentives for biodiversity conservation. Institutions are frequently geared towards other goals (such as agricultural expansion, export or employment promotion, or industrial development), and omit consideration of biodiversity. They can also discourage biodiversity conservation because they represent only the interests of a particular group or sector (such as government, industry or foreign companies), or do not work well in practice – it is not uncommon even for the institutions mandated with biodiversity management to exclude key biodiversity users, managers or stakeholders such as local communities or the private sector, or to be ineffective in implementing on-the-ground conservation activities. Examples include the lack of consideration of biodiversity in sectoral institutional mandates, the monopoly control of government over protected areas and exclusion of local residents, poor land and resource tenure arrangements, the establishment of natural resource management institutions which exclude key users or sectors of the population;
- ***Livelihood failures:*** Bio-physical and demographic conditions and local pressures – which are also often linked intimately to the nature of economic policies, markets and institutions – all determine people's livelihood activities and their needs, constraints and opportunities. These circumstances sometimes mean that people have no option but to degrade biodiversity in the course of their economic activities. When livelihood circumstances and economic opportunities are insecure or limited, and when there are few available sources of income and employment – at local or national levels – people often have little choice or alternative but to over-exploit, convert or otherwise destroy biodiversity in order to survive. Examples include over-dependence on biological resource harvesting for income or subsistence, land and population pressure, war and civil insecurity, seasonal stress and drought, poor infrastructure and markets, and widespread poverty.

Where broader policy, legal, market and institutional circumstances provide perverse incentives for biodiversity degradation, or disincentives to biodiversity conservation, there is a need to identify and overcome them, and to instead set in place a system of incentives that encourage biodiversity conservation.

3. TYPES OF ECONOMIC INCENTIVES FOR BIODIVERSITY CONSERVATION

Once the economic causes of biodiversity degradation have been identified and the need for economic incentives highlighted, specific incentive measures can be chosen to change people's economic behaviour and promote biodiversity conservation. Three broad categories of economic incentives can be defined that have relevance for biodiversity conservation:

- ***Direct incentives:*** Mechanisms which are targeted to specific objectives and encourage people to conserve biodiversity by providing rewards for changed behaviour;
- ***Indirect incentives:*** Mechanisms which encourage people to conserve biodiversity by setting in place general enabling conditions that will cause them to change their economic behaviour;
- ***Disincentives:*** Mechanisms that penalise people when they degrade biodiversity, and thus discourage them from engaging in activities which give rise to biodiversity loss.

Table 1: Summary table of categories of economic incentives for biodiversity conservation

	Direct incentives	Indirect incentives	Disincentives
Property rights	**Examples:** Ownership, management, access, and use rights over biodiversity. Joint, collaborative and co-management of biodiversity. Leases, concessions, licences, permits and franchises to manage, use, harvest and prospect biological resources.		**Examples:** Exclusion, alienation from land and biodiversity. Enforcement and penalties for unsustainable or illegal biodiversity use.
Markets and charge systems	**Examples:** Improvement of existing biodiversity markets and prices., development of new biodiversity markets and charges – tourist levies, entrance fees, user fees, prospecting fees, royalties. Tradable quotas, permits, rights and licenses.	**Examples:** Development of alternatives to biodiversity markets and products. Eco-labelling and accreditation of sustainable biodiversity products.	**Examples:** Bans on biodiversity-impacting products or markets. Biodiversity-impacting product quotas or limits.
Fiscal instruments	**Examples:** Subsidies to biodiversity conserving activities, technologies and products. Tax relief or differential taxes on land uses, technologies and products. Credits and offsets for biodiversity conserving activities.		**Examples:** Biodiversity-impacting product taxes or surcharges. Differential land use, technology and product taxes.
Bonds and deposits			**Examples:** Security deposits, restoration bonds, assurance bonds, conditional resource security
Livelihood support	**Examples:** Improving efficiency, scope and sustainability of biodiversity utilisation.	**Examples:** Rural development, livelihood diversification and improvement. away from biodiversity.	

Within these broad types, economic incentive measures can take a number of forms[ii], and can be grouped into five main categories:

- ***Property rights:*** Measures which allocate rights to own, use or manage biodiversity;
- ***Markets and charge systems:*** Measures which rationalise prices and improve markets for the goods and services which depend or impact on biodiversity;

- ***Fiscal instruments:*** Budgetary measures which apply taxes and subsidies to the goods and services which depend or impact on biodiversity;
- ***Bonds and deposits:*** Measures which require the provision of monetary security when economic activities are carried out, refundable against any biodiversity degradation and loss occurring as a result of that activity;
- ***Livelihood support:*** Measures which strengthen and diversify the livelihoods of people whose production and consumption activities impact on biodiversity.

All of these incentive measures work in different ways and through different mechanisms (Table 1), but have the common goal of correcting the broader distortions and failures in markets, policies, laws, institutions and livelihoods which comprise the underlying economic causes of biodiversity loss, and modifying or replacing the specific economic activities that lead directly to biodiversity degradation. They aim to make sure that people take account of the full economic value of biodiversity – and the full economic costs associated with its loss – when they produce and consume, by ensuring that these costs and losses are reflected in the private profits, prices and returns they face. ***The paragraphs below look in more detail at these different categories of economic incentives for biodiversity conservation.***

3.1. Property rights

Property rights deal with the fact that market failure is due in part to the absence of well-defined, secure and transferable rights over land and biological resources. They recognise that the primary beneficiaries of biodiversity are usually the individuals or groups who have recognised rights to own, manage, use and trade in it. Even when producers or consumers have a major stake, interest or traditional right in over resources, they are often prevented from accessing them. There is little economic gain from conserving biodiversity under these circumstances, because people have no right to benefit from it. Conversely, if they have no secure rights over resources, producers and consumers do not have to bear the on-site implications of biodiversity degradation.

By establishing property rights and allocating them to key users and beneficiaries, biodiversity markets and scarcity prices should emerge, and permit the users and owners of biological resources to benefit from conservation or be forced to bear the on-site implications of degradation. Examples of property rights include the allocation of legal rights, tenure, leases and concessions over the ownership, management and use of biological resources or biodiversity areas.

Examples of the use of property rights for biodiversity conservation

Property rights are often used as economic incentives for the local communities who use biological resources or live in biodiversity areas. The allocation of community property rights in National Parks and Forest Reserves is particularly widespread. For example, in South Africa, the land upon which Richtersveld National Park lies is owned and occupied by local Nama villages[iii]. These communities have leased out the land to the government, while retaining the right to graze an agreed number of livestock in the park and to engage in the controlled harvest of certain natural resources. Lease payments are deposited into a trust that has been appointed by the community to manage this resource. A similar system operates in reverse in a marine protected area in St. Lucia[iv], where

communities have been granted the right to manage an area that is owned by the state. Here, a collaborative management agreement has been established between government and a community institution with the capacity to manage the park. Fees raised are placed in a separate government fund, which makes quarterly payments directly to the community institution for the management of the protected area.

Since the late 1970s, efforts have also been made to grant forest property rights to communities living in the hills of Nepal[v]. Here, community user groups are legally assigned use and access rights over resources in both community and state-owned forests. Under this mechanism the direct users of forests are identified and organised into groups, who then elect a committee and write a management plan and rules. On approval of this plan, legal tenure of the forest is given over to the group. Since 1979 some 28,000 ha of plantations and 25,000 ha of protected forests in Nepal have been put under the management of local communities in this way.

Property rights in biodiversity can also easily be allocated to commercial firms and private companies. For example, in Kenya, there exist a number of privately-owned wildlife reserves[vi], and plans are underway to allocate commercial logging franchises and leases to private forest industries[vii].

Many of the examples of other private and community economic incentives for biodiversity conservation in the boxes below – such as the establishment of tradable rights for residential and industrial developments, of tradable permits for pollution and emissions, of new utilisation activities and markets and of quotas in resource use are also based on the allocation of some form of property right to private individuals or community groups. Almost all of the innovative mechanisms for attracting private sector investment to biodiversity, or of forging new partnerships between government, the private sector and local communities, also rely to some extent on property rights being assigned to the co-users or co-managers of biodiversity (these examples are given below in the section on financing measures for biodiversity conservation).

3.2. Markets and charge systems

Market and charge systems aim to overcome the distortions and weaknesses in prices and markets that send the wrong signals to producers and consumers and encourage them to degrade biodiversity because it is cheaper, easier or more profitable to do so. They entail trading in biodiversity goods and services and giving them a price that reflects their relative scarcity, costs and benefits.

Creating markets ensures that biological resources are allocated efficiently and put to their best use according to people's willingness to pay. Creating the ability to buy, sell and trade in biodiversity, or to exchange biodiversity-damaging economic activities between sites, can encourage biodiversity conservation and discourage activities which result in biodiversity loss. Assigning charges or prices to biodiversity goods and services is also a means of generating revenues. Examples of market creation and charge systems include the direct creation of markets – such as by instituting the purchase and sale of biodiversity goods and services and value-added products where there is a demand and willingness to pay on the part of consumers; the establishment of tradeable rights, shares and quotas in biological resources and environmental quality – such as fishing quotas, pollution permits or development rights; setting new charges or rationalising existing charges – such as park entry fees, biological resource utilisation licences, environmental pollution and waste clean up charges; and initiating charges for biodiversity goods and services which are currently received free – such as downstream water catchment benefits, storm protection or consumptive and non-consumptive biological resource utilisation activities.

Examples of the use of markets and charge systems for biodiversity conservation

Incentives can be provided through improving the ways in which markets work. One way of doing this is to take steps to ensure that consumers are able to make choices based on the knowledge of whether commodities contribute to biodiversity conservation. An example is provided by the recent rise in the number of products available in the USA that are marketed as being "biodiversity-friendly". These include[viii] Ben and Jerry's ice cream (made with wild nuts gathered sustainably from the South American rainforest), Banana Amiga (a green seal given by a consortium of US and Costa Rica NGOs), Café Monteverde (a partnership for sustainable coffee production between Montana Coffee Traders, The Nature Conservancy and the Monteverde Co-operative of Costa Rica coffee farmers), and vegetable ivory (a material for buttons and jewellery harvested sustainably in rainforest buffer zones in South America by indigenous people in conjunction with Conservation International).

New markets for biological resources themselves, or for alternatives or substitutes to them, can also be used as indirect incentives to take pressure off biodiversity. For example in the Bazaruto Archipelago in Mozambique[ix] – one of the country's most vulnerable, diverse and valuable marine areas – a number of new markets and enterprises have been promoted among local fishing communities as a way of stimulating sustainable biological resource use, and in order to compensate for the economic losses in land and natural resources incurred by the establishment of a National Park. New biodiversity markets include eco-tourism and artisanal resource use, while alternative markets include permaculture and vegetable farming. Establishing new markets in ecosystem services is also a way of ensuring that biodiversity values are considered when economic decisions are made off-site. For example, it has been proposed[x] that charges be levied on the hydro-power schemes relying on Mount Kenya Forest's catchment provision services, and that a proportion of downstream urban water charges are also returned to forest conservation.

Another way of using market incentives for biodiversity conservation is to make sure that the prices and markets for biological resources themselves incorporate efficiency and scarcity concerns. An example of this is the rationalisation of timber prices and royalty rates in Kenya[xi] so as to reflect the true costs of forest management and the relative scarcity of indigenous species. In New Zealand, the establishment of tradable fishing quotas[xii] takes this concept one step further – not just are fishing licence fees set at realistic levels, but a market has been established which makes quotas freely tradable between fishermen. Tradable catch quotas are issued by the government on all fish harvested, and allocated to individual fishermen. These quotas can then be sold on to other fishermen, or back to the government. This scheme simultaneously addresses a number of problems relating to over-fishing – it sets catch at a maximum level, protects the resource, raises revenues, increases efficiency, and makes fishing allocations more equitable.

Tradable development rights are used as incentives for biodiversity conservation in many parts of the world. For example, coastal areas of the threatened Akamas Peninsula in Cyprus[xiii] have been zoned by government as a non-development area. Under this scheme developers, instead of being compensated with cash for activities foregone, retain their rights to development but cannot exercise them on-site. Instead, development rights can be traded for property in other areas, or sold to groups concerned with the conservation of the Akamas Peninsula. A similar scheme operates in part of New Jersey, in the USA[xiv]. Pine Barrens, a biologically unique area, contains three zones – protection, limited use and commercial growth. Land owners in the first two zones can earn conservation credits by placing restrictive covenants on their property, which preclude development. These credits can then be sold to property owners in the third zone who wish to develop their land, or can be used to guarantee bank loans for other activities.

Tradable permits have also, since 1975, been used by the USA Environmental Protection Agency as a way of minimising pollution[xv]. A variety of tradable annual permits for emissions have been introduced and allocated to firms which can, if not fully used, be sold to other industries or used to offset emissions in other sites – these have been applied to lead in gasoline. ozone-depleting chemicals, acid rain-causing electric utility installations and smog production. More recently, this principle of credits has evolved into one of

tradable allowances, which have to be renewed once they are used up.

3.3. Fiscal instruments

Fiscal measures raise and spend budgetary revenues on raising or lowering the relative prices of different products, thus aiming to discourage or encourage their consumption and production. They can be used to correct or counterbalance distorted prices in biodiversity and other markets, and typically include various types of taxes and subsidies[xvi]. Fiscal measures can raise the relative price of biodiversity-degrading products and technologies in line with the costs of the damage they cause and discourage people from using them, and decrease the relative price of biodiversity-conserving products in line with the benefits of conservation and encourage people to use them. They can also be used as a budgetary tool to raise revenues. Examples of fiscal instruments include differential tax rates – such as relatively higher taxes on biodiversity depleting land uses, equipment, inputs and products, or subsidies to biodiversity-neutral or biodiversity conserving technologies, land uses and enterprises

Examples of the use of fiscal instruments for biodiversity conservation

A common way of using fiscal instruments as incentives for biodiversity conservation is to manipulate the market prices of different products through the application of selective taxes and subsidies. One example of this can be found in Eritrea, where energy taxes and subsidies are used as incentives to encourage the use of forest-saving technologies[xvii]. Deforestation as a result of over-exploitation of firewood and charcoal, the main cooking fuels, has long been a major problem in Eritrea, and has recently started to be addressed through pricing policies. In order to persuade people to change their energy consumption patterns and to consume less woodfuel, the government has implemented a series of fiscal reforms in the energy sector which aim to make woodfuel and woodfuel-using cooking technologies relatively more expensive to users. These reforms include subsidies to kerosene, the promotion of energy-efficient woodfuel cooking stoves, and the dismantling of duties on imported solar equipment.

Fiscal instruments are also widely used as tools to encourage land uses which contribute to biodiversity conservation. For example, in Brazil, the government provides a property tax exemption to encourage the creation of reserves on private lands[xviii]. A presidential decree, made in 1990, gave the power to regulate protected reserves to the Brazilian Institute of Environment and Renewable Resources. The institute can now declare private lands as special and natural patrimony reserves, where hunting, fishing, capturing animals, burning and deforestation are banned. Private lands so designated are exempt from federal tax. Similarly, in Canada[xix], land owners may without tax penalties donate ecologically-sensitive lands to municipalities and registered conservation charities for protection Other examples of land owners being given incentives to conserve biodiversity through the use of fiscal instruments include various subsidies made to sustainable agricultural land uses in Switzerland[xx] through the use of per hectare direct payments for the creation of ecological set-asides, organic production, and the maintenance grasslands, hedges, shrubs and flowered fallow land.

3.4. Bonds and deposits

Bonds and deposits are product surcharges which shift the responsibility for biodiversity depletion to individual producers and consumers. They are levied on activities that run the risk of harming biodiversity, and require the person carrying out these activities to pay a bond or deposit before they start, refundable against the possibility of this damage occurring. By charging in advance for possible biodiversity damage, bonds and deposits provide funds for covering the costs of this damage and ensure that producers or consumers cover the cost themselves, and also presents an incentive to avoid biodiversity

damage and reclaim the deposit or bond. Examples include those set on land restoration, disposal of dangerous or hazardous chemicals, waste clean up and proper harvesting of biological resources.

Examples of the use of bonds and deposits for biodiversity conservation

Bonds and deposits are most commonly used in the commercial, construction, industrial and infrastructural sectors in order to provide disincentives to biodiversity degradation. They can be applied to natural resource-based industries such as forestry, mining, fisheries and other extractive utilisation activities as a tool to discourage negative biodiversity impacts at the same time as promoting efficiency in resource utilisation. For example, a form of deposit bond on commercial forestry operations was established in the early 1990s in the Democratic Republic of Congo[xxi]. This arrangement grants an "interim concession licence" which requires loggers to complete various forestry planning and management operations, including forest inventory and investigation of efficient harvesting and processing techniques. If the concessionaire does not make the necessary investments within 3 years, the interim licence is cancelled and monies are not refunded.

Bonds and deposits are also highly relevant to tourism, urban, industrial and residential developments which run the risk of harming biodiversity. For example, in the Seychelles, bonds are already levied successfully on all public events for waste disposal and clean up[xxii]. It has been suggested that such measures could be further extended, and targeted specifically at the tourist industry, including refundable beach waste deposits that could be offset against clean-up costs, and refundable mooring fees in marine reserves could be established to encourage the use of designated buoys and anchoring points and to discourage reef damage from tour boats.

3.5. Livelihood support

Livelihood measures deal with the fact that the nature of livelihoods, and in particular their constraints and shortfalls, forces people to degrade natural resources in the search for scarce subsistence, income and employment. By strengthening livelihoods, diversifying them and making them more secure, these measures aim to decrease reliance on biodiversity and to put people in a position where they will choose, and can afford, to curtail economic activities that degrade biodiversity.

A range of livelihood measures can be used as incentives for biodiversity conservation. These can be broadly divided into direct incentives that encourage people to use and manage particular biological resources or ecosystems more sustainably and indirect incentives that, by strengthening and diversifying rural livelihoods, make people rely less or move away from exploiting biodiversity.

Direct livelihood incentives are usually focused on enhancing the efficiency and scope of biodiversity-based activities so as to increase their value and sustainability. Examples include interventions to promote efficient harvesting techniques, to train people in processing skills or to investigate new products and technologies. Indirect livelihood incentives assume that by strengthening and diversifying livelihoods, and making them more secure, people will rely less on biodiversity. They include a wide range of rural development activities and support to social infrastructure and employment generation.

Examples of the use of livelihood support for biodiversity conservation

Community benefit-sharing is a widely-used livelihood incentive for biodiversity conservation, using the revenues generated by protected areas to finance development activities in adjacent rural areas. For example, most wildlife departments in East Africa engage in benefit-sharing activities around National Parks. The Kenya Wildlife Service's revenue sharing policy is typical, using a Wildlife Development Fund as a mechanism to distribute some of the revenues earned from protected areas to local communities[xxiii]. Initially this was based on a quarter of gate fees, subsequently revised. Between 1991 and 1995 over US$ 1.25 million was allocated to community-related activities in protected area buffers zones, including water, education, health, livestock and enterprise development as well as the provision of famine relief. Such revenue-sharing mechanisms currently operate in thirty three Districts of the country.

Livelihood incentives often also take the form of developing resource utilisation activities so as to improve local income and subsistence. For example, the Foundation for the Philippine Environment focuses on biodiversity conservation and sustainable development activities[xxiv]. It specifically works with small community initiatives which are ignored by larger government and donor programmes and projects. One project, located in the mangrove area on the island of Bohol in the Central Philippines, works with a local community who harvest Nipa (a palm-like species of mangroves whose leaves are used for thatching houses). The project has helped this community to form themselves into an organisation which was granted stewardship rights over the mangroves. This organisation has now developed a resource inventory, and is engaged in more efficient, value-added and sustainable mangrove utilisation activities.

In Kasungu National Park, Malawi[xxv], local people have been given the right to harvest tree caterpillars and to establish beehives in exchange for curbing other uses of natural resources which are incompatible with the objectives of the park. The gross income from these micro-enterprises is almost US$ 250 per hectare – earnings which are higher than the income realised by subsistence farmers from maize, beans and groundnuts, the main local crops.

Another common form of livelihood incentives is the establishment of local enterprises, either based on biodiversity or as alternatives to biodiversity-depleting activities. For example the Kenya Wildlife Service Wildlife Development Fund is now moving towards providing credit encouraging landholders to invest in wildlife enterprises (such as eco-tourism, game ranching, processing of wildlife skins and other products) and to sustainable sources of natural products (such as beekeeping and woodlots).

4. FINANCIAL INSTRUMENTS FOR BIODIVERSITY CONSERVATION

It is vital that the people upon whom biodiversity conservation depends are provided with sufficient financial incentives to do so[xxvi]. Financial instruments are a category of incentive measures which are used to mobilise and channel funds to biodiversity. They deal with the fact that conservation is not a cost-free exercise. As well as direct expenditures on projects and programmes, biodiversity conservation gives rise to costs by interfering with other economic activities and incurring opportunity costs. These costs accrue to government, to commercial and private sectors and to individuals, households and local communities. Funds are needed to offset and compensate for these costs. Not only does finance need to be generated, but mechanisms also established which ensure that funds accrue to the individuals or groups who bear the costs of biodiversity conservation.

4.1. Limitations of conventional funding sources

One way of funding biodiversity conservation is to rely on conventional financial instruments. Traditionally, three major categories of instruments are used to raise finance –borrowing from banks and other commercial lending institutions; multilateral, bilateral and NGO grants and loans; and public sector investments, subventions and budgetary allocations[xxvii]. There is no reason why some or all of these sources of funds should not be tapped for biodiversity conservation – they are after all the primary means of financing other public and private sector activities in most countries. They however all have common limitations which may constrain the degree to which they can fully meet biodiversity funding needs.

A major constraint to the use of conventional sources of finance for biodiversity conservation is that they are limited in scope and amount. There is frequently little potential either for increasing the overall amount of finance available from them, or for reallocating funds to biodiversity from other activities. Both government budgets and donor funds are low and under severe pressure from other sectors of the economy such as defence, health and education, all of which are often seen as having a more urgent need, and priority claim, on public finance than biodiversity conservation. Sources of private and commercial investment funds are also limited and under heavy competition from activities which may be more easily able to demonstrate themselves to be profitable and secure investment opportunities than biodiversity.

Conventional sources of finance are also often unsustainable. Donor funds are limited, government budgets are mostly decreasing in real terms, and both commercial and donor loans incur financial and pay-back burdens. As well as stretching already indebted public and private sectors and sometimes being uncertain over the long-term, such financing mechanisms run the additional risk of decreasing national, individual or group control and sovereignty over biological resources because they depend on external decisions and are often tied to particular conditions, goals or activities.

For these reasons, although conventional financing mechanisms provide a useful source of funds for biodiversity conservation, they are usually by themselves inadequate, and may not even be desirable for all types of conservation activity. There is a clear need to consider

additional sources of finance for biodiversity conservation which can fill the gaps left by conventional mechanisms, and which have the potential to be more sustainable over the long-term. Two innovative and additional sources of finance are especially relevant to biodiversity conservation, and are considered below:

- ***Domestic private sector investment***
- ***International financial flows***

4.2. Domestic private sector investment

There is no reason why the state should have a monopoly on funding or managing biodiversity – most countries have an efficient and rapidly expanding private sector, including large-scale commercial concerns as well as small-scale and community-level groups. There is great potential for encouraging private and community sector investment in biodiversity. This can not only generate funds, it can increase public participation in biodiversity conservation and transfer some of the cost burden away from government.

For the private sector to be more fully engaged, biodiversity must be made into an attractive and accessible investment opportunity. There are a range of ways in which the private sector can be encouraged to invest in biodiversity conservation. Most importantly opportunities must be created for private engagement, both in terms of ownership and control of biological resources and biodiversity areas as well as in support to sustainable biodiversity-based enterprises such as the extraction and processing of biological resources or biodiversity tourism.

Support can be provided to the entry of the private sector into biodiversity conservation in various ways, including research and development into new biodiversity products and markets, the elimination of barriers to trade and business, the allocation of concessions, franchises, sponsorship and advertising deals in biodiversity areas or enterprises, the provision of credit on favourable terms and other inducements to investment. Many of these forms of support can be made under joint arrangements and partnerships between the public, commercial and community sectors.

The private sector can also be encouraged to invest in biodiversity aside from direct participation in biological-resource based enterprises and management of biodiversity areas and species. Efforts can be made to attract charitable contributions and donations through such mechanisms as trusts, foundations and endowments. Such contributions can be made more attractive to the private sector by providing incentives such as tax relief or publicity to contributors. Economic instruments can also be used as a means of raising revenues from the private sector and allocating them to various types of biodiversity funds – for example from subsidies saved, charges made or taxes levied.

Examples of domestic investment in biodiversity conservation

Over recent years, private investment in biodiversity conservation has been increasing rapidly, throughout the world. There are now many examples of cases where individuals and companies have invested in biodiversity in their own countries.

Investments in biodiversity are often made as joint undertakings between government and the private sector, or between the private sector and local communities. For example a new wildlife tourism facility is in the process of being developed on Village land adjacent to the Serengeti National Park in Tanzania[xxviii]. This camp will be run as a three-way joint venture between a commercial company, the local Village Council and a bilateral donor, who will provide the bulk of investment funds on a soft loan basis. A 40 year land lease, to be renewed every 5 years, has been agreed with the Village Council for the construction of the 30 bed camp. The terms of this lease and joint venture agreement include the allocation of equity in safari operations to the Village Council, a re-negotiable annual land rent of US$ 1,500 and bed fees of US$ 5 per visitor. The camp management has also committed to support village income and employment through sourcing foodstuffs locally, drawing staff – including management trainees – from the locality and establishing a micro-credit scheme for villagers. If a similar occupancy rate to other lodges in the Serengeti area is achieved, this may provide rental and bednight fees of some US$ 20,000 a year for the Village, in addition to other local income and employment opportunities associated with the camp.

Biodiversity areas such as National Parks are also starting to be seen as business opportunities, and this potential is beginning to be recognised by governments. For example, new environmental legislation in Zanzibar specifically allows for protected area management to be delegated to private enterprises[xxix]. Chumbe Island Coral Park is one such area that is managed by a company formed specifically for this purpose. Incentives for private investment were provided by the government by allocating a lease and management contract to this company. While particular project components were financed by donor small grants and credit facilities available for private initiatives, running costs are mainly covered by income generated from the park.

Financial instruments that mobilise funds and make them available for biodiversity conservation can also provide strong incentives for private investment. Various such funds exist – from small-scale credit and grant-making facilities such as the community-targeted Wildlife for Development Fund in Kenya[xxx], to large-scale lending from financial institutions. IFC, the International Finance Corporation of the World Bank, is for example developing a biodiversity enterprise fund for Latin America[xxxi]. This aims to be a private equity fund to mobilise capital to for investment in biodiversity-related projects such as organic agriculture, sustainable forestry, non-timber forest products, eco-tourism, biodiversity prospecting and pollution control. The fund would bring together foreign and local investors, grant funds and expertise, and make them available to domestic entrepreneurs.

Incentives for private investment in biodiversity can also be targeted at charitable donations, as well as at commercial enterprises and undertakings. The Seychelles Environmental Trust Fund, for example, relies on voluntary contributions from individuals and companies, and allows some level of tax relief on such contributions[xxxii]. In the USA an income tax deduction is also given for charitable contributions, which permits taxpayers to deduct the value of qualified charitable donations from their annual taxable income[xxxiii]. Among other things, this deduction is specifically allowed for a donation of a real property interest for conservation purposes to a qualified organisation. The deduction provides a financial incentive to dedicate land for conservation purposes and has stimulated donations of land or easements to land trusts around the country. According to the Land Trust Alliance, over 2 million acres has been protected with conservation easements.

4.3. International financial flows

Donor arrangements are not the only means of funding biodiversity conservation from international sources. Multiple other possibilities exist for attracting international finance, including those which encourage the transfer of private financial resources as well as the more innovative use of donor funds. Although many of these arrangements are in use, it is worth noting that some have given rise to great controversy, especially in issues relating to national sovereignty, ownership and control over biological resources and the balance of power between developed and developing countries.

- A range of ***international funds*** can be used to finance biodiversity conservation. These include trust funds, foundations, endowments, revolving funds, green funds and other grant or loan-making entities. These funds can both be used as a means of raising money from international sources as well as channelling money to biodiversity conservation.
- Various approaches to ***debt relief*** such as debt rescheduling, debt forgiveness, debt-for-equity and debt-for-nature swaps can be used as a means of simultaneously generating funds, increasing private and NGO participation in biodiversity conservation and reducing national indebtedness.
- ***Offsets and credits*** can generate flows of funds from international industries to biodiversity conservation. For example under carbon offset and credit arrangements, developed country power utilities finance the operations of a developing country Forest Department, in exchange for credit for the amount of carbon saved or sequestered.
- ***International compacts*** are voluntary agreements made by developing countries to engage in policy reforms and biodiversity conservation in exchange for the transfer of financial or technological resources from international sources to support these reforms.
- ***Concessions or prospecting rights*** can be offered in biodiversity areas and species to companies interested in their possible future uses – for example agricultural, industrial and pharmaceutical applications – of biodiversity and genetic resources.
- ***Internationally transferable development rights*** offer for sale units of areas set aside for biodiversity conservation to groups with an interest in biodiversity conservation, or for firms who can use them as an credit or offset.

Examples of international financial flows to biodiversity conservation

Various types of international environmental funds and trusts have been set up for biodiversity conservation. For example, the conservation of Bwindi Impenetrable Forest and Mgahinga Gorilla National Park in Uganda is financed through a trust fund[xxxiv].A consortium of donors, led by the Global Environment Facility, made available sufficient capital to be invested on the world capital markets. The annual interest from this capital is used to finance forest biodiversity conservation.

Many countries with high biodiversity have benefited from debt-for-nature swaps in recent years. For example, several African countries have engaged in arrangements under which a portion of their external debt is purchased at below face value by an outside agency – usually an NGO – and redeemed against local currency which is allocated to national conservation activities[xxxv]. These include swaps made in Madagascar with WWF and Conservation International (generating US$ 6.1 million for conservation), Zambia with WWF (US$ 2.3 million), Ghana with Conservation International (US$ 1

million), and Nigeria with Nigerian Conservation Foundation (US$ 0.1 million).

The Jamaica National Parks Trust Fund was established in 1991 and capitalised in 1992 with money from a debt-for-nature swap, under which a portion of the country's debt was purchased with cash provided by USAID, the Conservation Trust of Puerto Rico, the Smithsonian Institute, Fidelity Investments and The Nature Conservancy[xxxvi]. Additional contributions have also been received from domestic companies and individuals. The fund is managed primarily as an endowment trust, paying its expenses through investment income and leaving the principal untouched. Grants are made to two National Parks, including contributing to the operating costs of the Montego Bay National Marine Park.

Various schemes exist by which biodiversity-rich countries or sectors can benefit from credit and offset arrangements. The most common type of credit-offset systems are currently those relating to carbon emissions and greenhouse gases. For example, under the FACE programme, Uganda National Parks receives funds for afforestation and forest management from a commercial power generation firm in the Netherlands[xxxvii]. This money is invested in forest management in Uganda because forests act as carbon sinks and offset the carbon emissions resulting from power generation. Started in 1994, the FACE programme made available US$ 2.11 million for the management of 35,000 ha of forested parks in Uganda.

Ensuring that international companies pay for their use of biodiversity is also a way of generating funds for conservation. There are many examples of payments made for biodiversity use and prospecting. For example, a variety of governments in sub-Saharan Africa have entered into biodiversity or genetic prospecting concession arrangements with medical and pharmaceutical organisations regarding the search for naturally occurring biochemical compounds with commercial values[xxxviii]. Here, concession fees and some proportion of promised royalties for any commercially valuable discoveries are paid in advance, and a certain proportion allocated to the *in situ* conservation of genetic resources. These include agreements between the British Firm Biotics Ltd and Ghana, and the US National Cancer Institute with Madagascar, Tanzania and Zimbabwe.

Such payments may also be targeted at particular resources or ecosystems. For example, a number of useful applications for coral reef species for medical and pharmaceutical applications have been discovered, and many more are under development – such as compounds against cancer, treatments for heart disease, sunscreens and bone graft substitutes[xxxix]. There is a high level of international commercial and industrial interest in this potential. In line with this interest Imperial Chemical Industries has acquired the rights to develop a number of reef pigments for use as sunscreens for humans, and in 1992 the Coral Reef Foundation entered into a five year contract worth US$ 2.9 million for the supply of reef samples to the US National Cancer Institute for use in cancer and aids screening programmes.

5. SETTING IN PLACE ECONOMIC INCENTIVES FOR BIODIVERSITY CONSERVATION

As described in the section above, there exist a wide range of economic incentive measures with potential application to biodiversity conservation. The choice of which incentive measures to use in a given case depends largely on the reasons, and the circumstances, under which they are being applied. ***The choice of incentive measures for biodiversity conservation must take into account the specific groups, activities and sectors which they aim to work on, must be based on practically implementable actions, and must be acceptable and sustainable within the broader social, political and cultural context within which they are being applied.***

5.1. Targeting incentive measures to specific groups, activities and sectors

A major consideration in setting in place incentive measures is the types of groups, economic activities and sectors that they aim to target. Although it is in theory possible to apply any type of incentive measure to any group, activity or sector (Table 2), different categories of incentive measures have particular relevance for different groups and activities – for example, livelihood support is especially relevant for rural communities who live in areas of high biodiversity, bonds and deposits are particularly applicable to infrastructural, residential and industrial developments, fiscal instruments will only function well in formal markets, and property rights provide an effective way of ensuring community and private sector participation in biodiversity conservation.

5.2. Practical issues in the implementation of incentive measures

Identifying niches and needs for the use of economic incentives for biodiversity, and actually setting them in place, are two very different things. Incentive measures, once chosen, must be translated into a series of concrete, practically-implementable, on-the-ground activities. Although the aim and focus of economic incentives will of course vary, depending on the reasons, circumstances and ends to which they are being applied, a number of common practical considerations arise in their implementation:

- ***Individual incentive measures only address a single problem, or aspect of biodiversity conservation.*** In reality, the reasons why people degrade biodiversity are multiple and complex, and simultaneously involve many different groups, activities and causes. There is usually a need to set in place a mix of compatible and mutually reinforcing incentives to reach a given biodiversity conservation goal.
- ***Most incentive packages combine a "carrot and stick" approach.*** If incentive measures focus only on providing disincentives to biodiversity degradation, they run the risk of losing the support of producers and consumers. Purely punitive or exclusionary measures are likely to prove unpopular, and may by themselves undermine economic efficiency and growth. Likewise, positive incentives for biodiversity conservation commonly need some kind of reinforcement and enforcement. Most incentive packages thus contain a balanced combination of positive incentives which reward or induce conservation and disincentives that discourage or penalise biodiversity degradation.

- ***Incentive measures require partners in their implementation.*** Few incentive measures are cost-free to implement. Almost all require funding. They also rely on concrete decisions and actions being made, at government, donor, private or community levels. Partners for the implementation of incentive measures must be defined, and their roles and responsibilities clearly agreed before a final choice is made.

5.3. The acceptability and sustainability of incentive measures

Countries have different social and economic characteristics, development goals and political ideologies. Incentive measures also rely on the compliance of producers and consumers themselves, as well as on the support of various other groups who have the potential to influence economic behaviour and biodiversity. Unless economic incentives are consistent with, and lend support to, wider goals and attributes they are unlikely to be politically, economically or socially acceptable, to be practically implementable or sustainable, or to contribute successfully to biodiversity conservation. Of particular importance is consideration of:

- Economic incentives must be ***politically, economically and practically acceptable at all levels*** – within biodiversity agencies, central government, the private sector and local communities. Any incentive measure which conflicts with the goals of these groups – for example by excluding stakeholders from participation in biodiversity management, by making people worse off or by contradicting wider social and economic ideologies – is unlikely to be appropriate or implementable in practice.
- Economic incentives must be ***consistent with, and supportive to, wider goals and activities specified in development or conservation plans***. Their overall aim is to support conservation and development, not to contradict or conflict with their aims and approaches.
- Care must be taken in ***targeting economic measures at particular groups***. Economic incentives will have little or no impact unless they act on the groups who are affected by, or whose actions have the potential to influence, the status and integrity of biodiversity.
- Economic incentives should make efforts to ***avoid increasing the external dependency and decreasing the local or national sovereignty*** of the local communities, conservation agencies and host countries where biodiversity is found. They should be based on strong considerations of maintaining independence and ensuring sustainability in conservation.
- ***Incentive measures should be simple to implement, and minimise on transaction, enforcement and participation costs.*** Even if they are externally supported, incentive measures will ultimately be maintained through the actions of government, local communities and producers and consumers themselves. They should be easy and cheap to implement for all groups concerned if they are to be sustainable over the long-term.

5.4. The need for additional supportive measures for biodiversity conservation

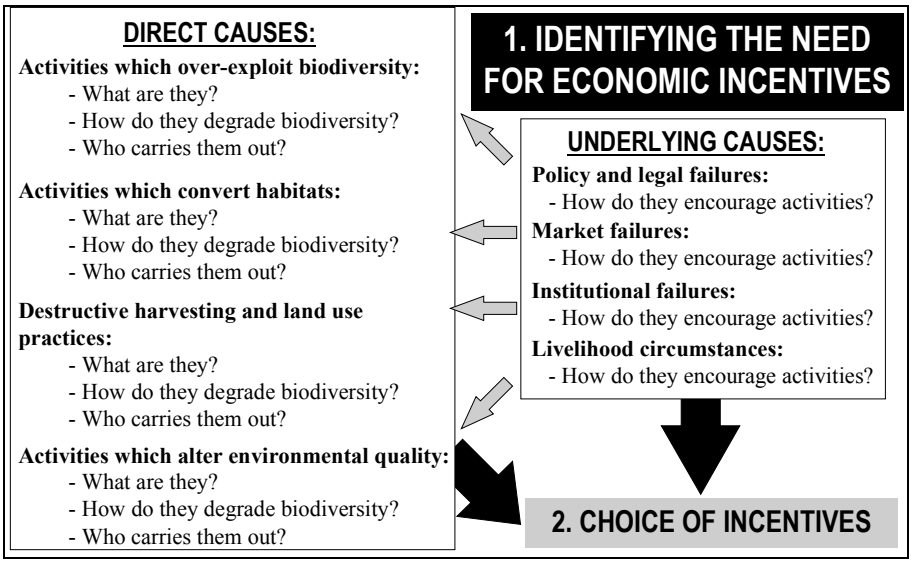
Economic incentive measures are only partial solutions to the problems associated with biodiversity degradation. In reality the determinants of biodiversity conservation and degradation, and needs for incentives, extend far beyond economic issues alone. Economic incentives for biodiversity conservation must always be accompanied by broader supportive measures that encompass more than economic concerns. Of particular importance is consideration of:

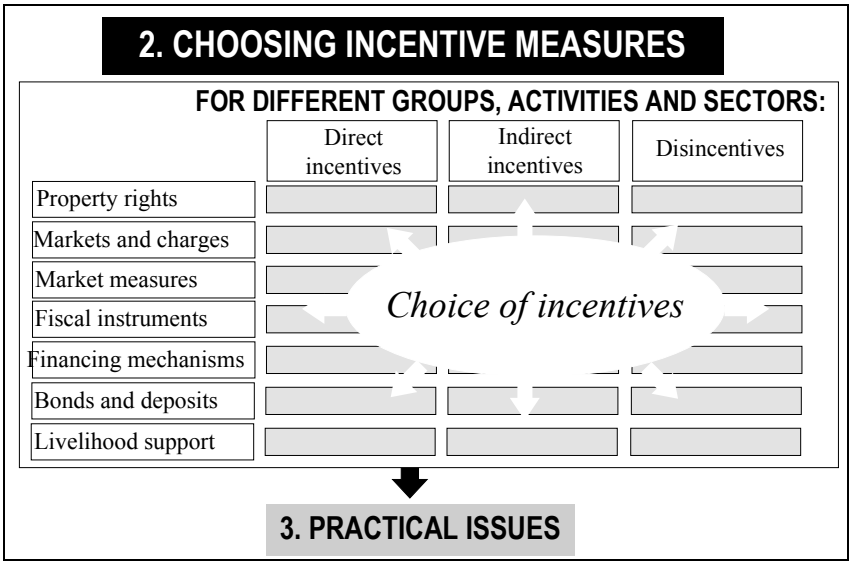
- ***Non-economic factors that encourage biodiversity degradation or discourage conservation.*** Although economic factors are an important determinant of biodiversity degradation, they are not the only cause. A range of other distortions, failures and gaps act against conservation. These forces, including those relating to culture, politics, information, awareness and social organisation, must also be addressed in biodiversity conservation strategies.
- ***National and global forces that encourage biodiversity degradation.*** Economic incentives attempt to overcome and counterbalance the effects of perverse incentives, but often cannot change the broader policies, institutions and markets that form their source. It is also important to modify the national and global policies, institutions and markets that underpin biodiversity degradation. Of particular importance are public sector, macroeconomic and sectoral policy reform, and careful consideration of the global agreements and donor arrangements that impose particular conditions on the economy and on biodiversity management and use.

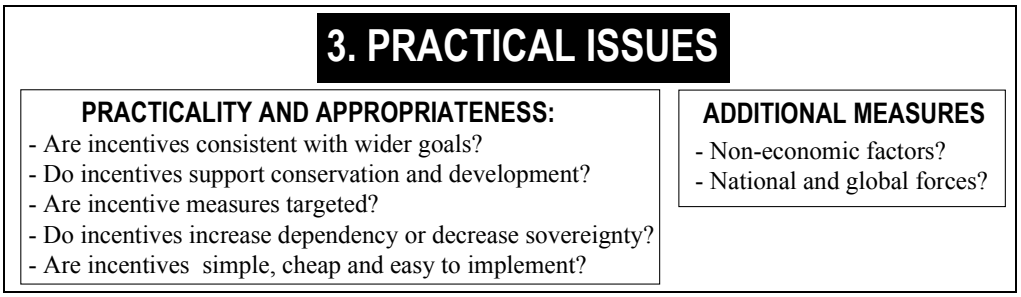
Table 2: Examples of economic incentives for biodiversity conservation in major sectors and ecosystems

	Property rights	Markets and charge systems	Fiscal instruments	Bonds & Deposits	Financing mechanisms
Land and soils	Land rights Use rights		Property taxes Land use taxes	Land reclamation bonds	Soil conservation loans
Water resources	Water rights	Water shares Water pricing Water protection fees	Capital gains tax		
Oceans and seas	Fishing rights	Licensing Tradeable catch quotas		Oil spill bonds	
Forests	Communal and private rights Concessions Leases	Concession bidding Royalties	Timber taxes Subsidies to reforestation	Reforestation bonds Forest management bonds	
Minerals	Mining rights	Tradeable shares	Use taxes Infill subsidies Betterment subsidies	Land reclamation bonds	
Wildlife	Management and use rights	Park entry fees	Subsidies to wildlife enterprise		
Biodiversity	Patents Prospecting rights Development rights	Transferable development rights Charges for scientific tourism			
Pollution		Tradeable pollution permits Treatment fees Technology subsidies	Pollution taxes	Waste delivery bonds Environmental accident bonds	Low interest loans Relocation incentives
Wastes		Collection charges	Waste taxes Subsidies to clean technologies	Deposit refund systems	
Climate	Tradeable emissions permits	Carbon offsets Carbon credits Tradeable CFC quotas	Carbon taxes BFU taxes		CFC replacement incentives

6. CHECKLISTS FOR IDENTIFYING AND USING ECONOMIC INCENTIVES FOR BIODIVERSITY CONSERVATION







NOTES:

[i] This definition of incentives for biodiversity conservation is taken from literature prepared in support of the Convention on Biological Diversity (UNEP/CBD/COP/3/24).

[ii] This paper deals only with economic incentive measures. There are a wide range of other possible – and equally important – incentives for biodiversity conservation in addition to the broad categories of economic measures that are mentioned here. These include legal, policy, institutional and social incentives, as well as measures such as agreements, enforcement, information and awareness, leverage and accreditation. Economic measures are often used to support these incentive measures.

[iii] McNeely, J, 1993, 'Economic incentives for conserving biodiversity: lessons from Africa' *Ambio* 22(2-3): 144-150

[iv] Geoghegan, T., 1996, 'Revenue generation to sustain coral reef conservation', *Intercoast Network* 27: 6/10

[v] Pradhan, A. and Parks, P., 1995, 'Environmental and socio-economic linkages of deforestation and forest land use change in the Nepal Himalaya', in Hanna, S. and Munasinghe, M. (eds) *Property Rights in a Social and Ecological Context: Case Studies and Applications*, Beijer International Institute of Ecological Economics, Stockholm and World Bank, Washington DC.

[vi] Emerton, L., 1998, 'Innovations for financing wildlife conservation in Kenya', presented at *10th Global Biodiversity Forum*, Bratislava

[vii] Emerton, L., 1998, *Mount Kenya: The Economics of Community Conservation*, Community Conservation in Africa Paper No. 6, Institute for Development Policy and Management, University of Manchester

[viii] McNeely, J. and Weatherly, P., 1995, 'Investing in biodiversity conservation', paper prepared for *Conference of the Parties to the Convention on Biological Diversity*, Gland

[ix] Reina, A., 1998, 'Bazaruto Project: a brief overview May 1998', in Salm, R. and Tessema, Y., (eds) 1999, *Partnership for Conservation: Report of the Regional Workshop on Marine Protected Areas, Tourism and Communities*, IUCN — The World Conservation Union, Eastern Africa Regional Office and Kenya Wildlife Service, Nairobi

[x] Emerton, L., 1998, *Mount Kenya: The Economics of Community Conservation*, Community Conservation in Africa Paper No. 6, Institute for Development Policy and Management, University of Manchester

[xi] Emerton, L., 1998, Mount *Kenya: The Economics of Community Conservation*, Community Conservation in Africa Paper No. 6, Institute for Development Policy and Management, University of Manchester

[xii] Panayotou, T., 1994, *Economic Instruments for Environmental Management and Sustainable Development*, United Nations Environment Programme, Environment and Economics Unit, Nairobi.

[xiii] Panayotou, T., 1994, 'Conservation of biodiversity and economic development: the concept of transferable development rights', *Environmental and Resource Economics* 4(1): 91-110

[xiv] Bowles, I., Downes, D., Clark, D. and Guerin-McManus, M., 1995, 'Encouraging private sector support for biodiversity conservation: the use of economic incentives and legal tools', *Conservation International Policy Papers*, Washington DC

[xv] Tietenberg, T., 1995, 'Design lessons from existing air pollution control systems: the United States', in Hanna, S. and Munasinghe, M. (eds) *Property Rights in a Social and Ecological Context: Case Studies and Applications*, Beijer International Institute of Ecological Economics, Stockholm and World Bank, Washington DC

[xvi] It is worth noting that the use of taxes and subsidies is ususally seen as a second-best, and temporary, solution to market failures. It is always more desirable to make markets function better, rather than to

introduce an additional distortion into markets which may already function poorly, and be subject to distortions (these distortions, such as subsidies to agriculture or to industry, are often themselves the cause of biodiversity degradation). They frequently often impose a heavy cost on taxpayers, or on scarce government budgets.

[xvii] Emerton, L. and Asrat, A., 1998, *Eritrea Biodiversity: Economic Assessment*, IUCN — The World Conservation Union, Eastern Africa Regional Office, Nairobi, and Department of Environment, Ministry of Land, Water and Environment, Asmara

[xviii] Bowles, I., Downes, D., Clark, D. and Guerin-McManus, M., 1995, 'Encouraging private sector support for biodiversity conservation: the use of economic incentives and legal tools', *Conservation International Policy Papers*, Washington DC

[xix] Rubec, C., 1998, 'Canadian case study on a national tax incentive measure for biodiversity', presented at workshop on *Incentives for Biodiversity Conservation: Sharing Experiences*, Montreal.

[xx] Schelske, O., 1998, 'Financial innovations for biodiversity: the Swiss experience', presented at workshop on *10th Global Biodiversity Forum*, Bratislava

[xxi] Panayotou, T., 1994, *Economic Instruments for Environmental Management and Sustainable Development*, UNEP, Nairobi

[xxii] Emerton, L., 1997, *Seychelles Biodiversity: Economic Assessment*, IUCN — The World Conservation Union, Eastern Africa Regional Office, Nairobi and Republic of Seychelles Conservation and National Parks Section, Division of Environment, Ministry of Foreign Affairs, Planning and Environment, Mahé

[xxiii] Barrow, E., 1996, 'Community conservation approaches and experiences from East Africa', *Community Conservation Discussion Paper* No. 4, African Wildlife Foundation, Nairobi

[xxiv] Tan, J., 'Environmental foundations: funding community innovations in biodiversity conservation', presented at *10th Global Biodiversity Forum*, Bratislava

[xxv] McNeely, J, 1993, 'Economic incentives for conserving biodiversity: lessons from Africa' *Ambio* 22(2-3): 144-150.

[xxvi] The importance of financing mechanisms is reflected in the provisions of the CBD, which includes two articles dealing specifically with the generation and allocation of funds to biodiversity conservation (Article 20: Financial Resources, and Article 21: Financial Mechanism), and contains repeated references to financial support in other articles.

[xxvii] For example, many of the economic instruments described in the last section, although having the primary aim of changing producer and consumer behaviour, can also be used to raise funds for biodiversity conservation – such as taxes, licence fees, charge systems, bonds and deposits.

[xxviii] Emerton, L., and Mfunda, I., 1999, *Making Wildlife Economically Viable for Communities Living Around the Western Serengeti, Tanzania*, IIED, London and IUCN — The World Conservation Union, Eastern Africa Regional Office, Nairobi

[xxix] Riedmiller, S., 1998, 'The Chumbe Island Coral Park Project: a case study of private marine protected area management', in Salm, R. and Tessema, Y., (eds) 1999, *Partnership for Conservation: Report of the Regional Workshop on Marine Protected Areas, Tourism and Communities*, IUCN — The World Conservation Union, Eastern Africa Regional Office and Kenya Wildlife Service, Nairobi

[xxx] Emerton, L., 1998, 'Innovations for financing wildlife conservation in Kenya', presented at *10th Global Biodiversity Forum*, Bratislava

[xxxi] McNeely, J. and Weatherly, P., 1995, 'Investing in biodiversity conservation', paper prepared for *Conference of the Parties to the Convention on Biological Diversity*, Gland

[xxxii] Emerton, L., 1997, *Seychelles Biodiversity: Economic Assessment*, IUCN — The World Conservation Union, Eastern Africa Regional Office, Nairobi and Republic of Seychelles Conservation and National Parks Section, Division of Environment, Ministry of Foreign Affairs, Planning and Environment, Mahé

[xxxiii] Clark, D. and Downes, D., 1996, *What Price Biodiversity? Economic Incentives and Biodiversity Conservation in the United States*, Centre for International Environmental Law, Washington DC

[xxxiv] Emerton, L., 1999, *Economic Tools for Environmental Planning*, IUCN — The World Conservation Union, Eastern Africa Regional Office, Nairobi

[xxxv] Emerton, L., 1999, *Using Economics for Biodiversity Strategies and Action Plans in Eastern Africa*, IUCN — The World Conservation Union, Eastern Africa Regional Office, Nairobi

[xxxvi] IUCN, 1994, *Report on the First Global Forum on Environmental Funds*, IUCN - The World Conservation Union, The Nature Conservancy and World Wildlife Fund-US, Washington DC

[xxxvii] Emerton, L., 1999, *Economic Tools for Environmental Planning*, IUCN — The World Conservation Union, Eastern Africa Regional Office, Nairobi

[xxxviii] Emerton, L., 1999, *Using Economics for Biodiversity Strategies and Action Plans in Eastern Africa*, IUCN — The World Conservation Union, Eastern Africa Regional Office, Nairobi

[xxxix] Spurgeon, J. and Aylward, B., 1992, *The Economic Value of Ecosystems: 4 - Coral Reefs*, Gatekeeper Series no LEEC GK 92-03, IIED/UCL London Environmental Economics Centre, London