

**AN INTERNATIONAL MARKET-BASED INSTRUMENT  
TO FINANCE BIODIVERSITY CONSERVATION:  
TOWARDS A GREEN DEVELOPMENT MECHANISM**

**A Proposal for a Green Development Mechanism**

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# 1 Introduction

Healthy, biodiverse ecosystems provide the goods and services that humans need for their well-being. Not only do individual components of biodiversity provide important forms of value, but the total amount of biodiversity remaining also provides the insurance and the information that protect and preserve the human production system. Despite its importance, biodiversity is declining at an alarming rate. As a result, the continued provision of these goods and services is seriously threatened.

Both the Millennium Ecosystem Assessment and a new study of the Economics of Ecosystems and Biodiversity (TEEB) identify the lack of markets and prices for ecosystem services to be among underlying causes for continued biodiversity decline, and both call for the further development and implementation of market based instruments to “internalize” ecosystem values in economic decision-making.

The Conference of Parties to the UN Convention on Biological Diversity (CBD), in its Decisions IX/6 and IX/11, acknowledges the need to develop such instruments to capture the value of biodiversity and ecosystem services and to generate new and additional resources for biodiversity conservation. Recent work on the development of International Payments for Ecosystem Services (IPES), led by IUCN and UNEP in close cooperation with the Secretariat of the CBD, has identified a range of opportunities to generate international finance for ecosystem services. It also identified the need for enabling frameworks to generate increased market demand for biodiversity.

The problem that must be solved by the parties to the CBD is rooted in the fact that the values of biological diversity flow to the global community at large, while most of the resources that generate them exist as domestic resources within the boundaries of an individual state. Add to this disjunction between owner and beneficiary the fact that the costs of biodiversity conservation lie primarily with the hosts (rather than the global community), and the need for international cooperation is clear.

This international cooperation needs to take the form of resource transfers to those agents making the decision to continue to host biodiversity or, equivalently, to make these transfers to those foregoing activities that cause damage to natural habitats. In addition, since development is an investment decision, this transfer of resources must be perceived by the hosts to be an ongoing flow of funding permanently associated with the decision not to undertake irreversible actions. Finally, the amount of the funding must be adequate to compensate for the opportunity costs of foregone development. Together, these three conditions are sufficient to create and maintain incentives for the retention of the subject habitat.

Such a system of transfers qualifies as a *financial mechanism* (rather than simple funding) because it sustains incentives for biodiversity conservation. This system of transfers also qualifies as a *green development mechanism (GDM)* because it provides incentives by paying amounts sufficient to compensate for foregone conversion, but linked to sustained biodiversity conservation.

This proposal sets out the case for a Green Development Mechanism (GDM). It then considers the form that a GDM might take. Here we establish a framework for considering the various components required to make up a GDM.

The key components of a GDM are proposed to be: 1) an aggregate constraint on development activities; 2) a certifying authority and certification process; 3) an agreed standard or procedure for enabling exchanges of development rights; and 4) an effective system for monitoring and enforcing the mechanism. With these four components, it is possible to create an aggregate constraint on further development, and hence a corresponding demand for the rights to develop. The willingness to pay for these rights, and their transfer between parties provides the basis for flows of funding to those investing in biodiversity. All that is required is agreement on the specific form that the constraints, agencies and procedures will take.

We examine how each of these issues has been addressed in the development of other funding instruments. These provide concrete examples for considering the range of possibilities available. In this paper we briefly survey the Clean Development Mechanism of the Kyoto Protocol, the voluntary mechanisms for biodiversity protection developed by Business and Biodiversity Offset Programme (BBOP), and the mandatory domestic mechanisms developed in the US, Australia and several other jurisdictions.

The object is to encourage interested parties to consider how these key constituents might be developed into a comprehensive and effective GDM. It is also important to map out a programme of future work for the development and implementation of a GDM. The overarching objective is to develop a proposal for consideration by CBD CoP10 (October 2010, Nagayo, Japan).

An accompanying background paper, “Towards an International Market-Based Instrument to Finance International Biodiversity Conservation: A Green Development Mechanism”, provides additional detail on the nature of the problem of biodiversity loss, and the ways that existing instruments have been used to address the problem. This is intended to provide additional examples of how the constituent elements of a GDM could be designed. We refer to the accompanying document as the “Background Paper”.

## **2 The Case for a GDM**

### **2.1 Evidence of decline in biodiversity**

For the purposes of assessing progress toward the 2010 targets, the CBD defines biodiversity loss to be “the long-term or permanent qualitative or quantitative reduction in components of biodiversity and their potential to provide goods and services, to be measured at global, regional and national levels” (CBD COP VII/30). Under this definition, biodiversity can be lost either if the diversity per se is reduced (such as through the extinction of some species) or if the potential of the components of diversity to provide a particular service is diminished (such as through unsustainable harvest).

As biodiversity includes diversity within species, between species and of ecosystems, there is no single measure that can fully express the rate and extent of biodiversity loss. However, by examining a range of measures, we gain a picture of dramatic reductions over time. At the species level, estimates suggest that the rate of species extinction may have increased by up to 3 orders of magnitude (MA 2005). At the same time, the IUCN Red List indicates that 25% of mammals and 12% of bird species are Critically Endangered, Endangered, or Vulnerable to extinction, in addition to 25% of conifers and 32% of amphibians.

Declines have also been observed in both the extent and the diversity of particular ecosystems. For example, as a result of human land conversion, global forest area has been reduced by 40% over the past 300 years, and continues to decline at a rate of 13 million ha per year (FAO 2005). Importantly, forest species in warmer temperate and subtropical areas are particularly threatened, as these areas have a higher diversity of species, many of which are localized, and are therefore in general more vulnerable to extinction (CBD 2004). The Background Paper also describes significant losses in diversity of marine, coastal and freshwater ecosystems. These include reductions in mangrove area of 35% in the last 20 years (MA 2005), and a decline in hard coral cover on reefs from 50% cover to 10% over 30 years (Gardner et al. 2003).

One important feature of biodiversity is that it is not evenly spread around the globe. Specifically, diversity tends to increase towards the equator, and the most species rich environments are moist tropical forests. These cover 7% of the world's surface and may hold up to 90% of the world's total species. Coral reefs and areas of Mediterranean climate in South Africa and southwest Australia also have high levels of biodiversity (CBD 2004). The result of this is that the majority of the world's biodiversity is located in developing countries.

## **2.2 Implications of biodiversity loss**

There are two key ecological consequences of biodiversity loss. The first relates to losses of ecosystem function, and the second to reductions in the resilience of ecosystems. In addition to the impacts of biodiversity on ecosystems, biodiversity will in some cases be important in itself for directly providing a range of goods and services that are valuable to people. For example, diverse forests may allow communities to collect a range of medicinal plants for different purposes, or can provide genetic information that is used for research into new agricultural crop varieties or development of pharmaceutical drugs. Biodiversity may also provide less tangible cultural services, for example by contributing to cognitive development, cultural traditions or spiritual inspiration. Recreational enjoyment is another service that may be provided directly by ecosystems with high biodiversity.

Through its impacts on ecosystem functioning, as well as the direct provision of tangible and intangible benefits, biodiversity has significant economic value at multiple spatial scales. At the local level, it can provide both productive and consumptive direct use values such as harvests of food and non-food products, and can also be important for increasing agricultural productivity and resilience. Local values are often relatively small

in absolute terms, but are frequently of most importance to the poorest communities, and therefore their losses may be highly relevant in equity terms.

At the national level, a key impact of biodiversity loss is on the provision of ecosystem services such as protection against flooding and water quality improvements provided by intact mangroves or wetlands. Addressing these impacts may require intervention, but this can often be implemented by national governments or even with private market-based contracting. Much of the literature on payments for environmental services (PES) deals with contracting for these more regional services. (see the Background Paper for more detail).

Recreation and amenity benefits of biodiversity can be experienced at the local, national or international level, and the values can be considerable. These benefits are often private in nature, and can therefore be more straightforwardly captured through existing market mechanisms.

Global benefits of biodiversity include the value of genetic information, contributions to the provision of global ecosystem services such as carbon sequestration, and non-use values for both biodiversity as a whole and for the preservation of individual species. These represent substantial welfare reductions as biodiversity declines. In addition, the impact of biodiversity on ecosystem resilience constitutes a global public good that is fundamental to life. All of these values also require institutional mechanisms at the global level in order to capture them. As a result, the mechanism proposed in this document is primarily aimed at capturing global use and non-use benefits of biodiversity, so that these uses are accounted for in local and national level decision-making processes. These are the values that require an international financial mechanism.

### **2.3 Causes of biodiversity loss**

The immediate drivers of biodiversity loss relate to the destruction of, or damage to, habitats and ecosystems. Habitat conversion for human activities is the largest single driver, while other important factors include the introduction of invasive species, disease, overexploitation, pollution and climate changes (MA 2005).

All of these underlying drivers are the result of problems of externality, whereby the full social costs of economic activities are not accounted for. Specifically, the private costs and benefits may be those of individual farmers, private firms, or consumers who make use of biodiversity or natural resources, while the social costs and benefits, including the costs of biodiversity loss described above, may be experienced at the level of the community, the country, the region or at the global level (Pearce and Moran 1994). The effect of this is that any mechanism for reducing losses of biodiversity must alter the local decision-makers' land use calculus in order to correct for the divergence between private and social costs associated with particular development paths or individual economic activities.

If we consider the importance of biodiversity as a global public good, while conservation has opportunity costs as the local level, there is a need for mechanisms through which the

benefits of biodiversity can be transferred to those who both bear the opportunity costs and who make the ultimate decisions about hosting or investing in biodiversity.

## **2.4 Existing approaches**

A traditional method of biodiversity conservation is the designation of Protected Areas, in which little or no economic activity is permitted. However, in many cases Protected Areas do not address the underlying incentives faced by local decision-makers, and as a result they are frequently ineffective (WCMC 1992). The problems of ‘paper parks’ arise when funds are insufficient to implement and enforce protected area restrictions. For example, almost half of the African elephant population was lost in the 1980s in four owner-states with protection budgets ranging between \$5 and \$15 per km<sup>2</sup>, while South Africa and Zimbabwe, whose budgets were \$4300 and \$475 per km<sup>2</sup> respectively, maintained stable populations (Swanson 1993). This is of particular concern because management budgets for parks and protected areas across the world are closely associated with national incomes, with developing countries, who host much of the world’s biodiversity, only able to afford to spend a fraction of that being spent in the developed world (James et al. 1999).

Another existing method of biodiversity conservation involves the provision of funding for the implementation of individual projects over a fixed period of time. This provides temporary incentives for refraining from economic activities that damage biodiversity, but does not provide the assurance of additional funds for the indefinite future. The pursuit of an alternative development path requires the creation of stable institutions promising long-term flows of funding to these investments, and a funding mechanism for biodiversity conservation must take this form.

The Global Environmental Facility (GEF) initiated at the World Bank is an important current source of funding for conservation of the global public goods provided by biodiversity. However, the funding is provided through time-limited projects. This would be appropriate for development investments that would become self-sustaining over time. However, the need for a funding mechanism in the case of biodiversity is of a very different character. As indicated above, the problem of biodiversity lies in the external uncompensated benefits that diverse resources render to the global community. No matter what values become appropriable by local communities, these external values will continue to exist, and it is necessary to re-channel them to the local communities if the correct quantities of diversity are to be retained. The biodiversity problem is **not** an instance of assisting developing countries in the conversion to reliance upon new capital stocks, but it is instead the need to aid them in the development of the flows of revenues from their existing assets.

## **2.5 Requirements for a ‘Green Development Mechanism’**

The means for reducing biodiversity loss will necessarily lie in the permanent alteration of the terms of trade between conservation and alternative economic activities, within the decision making framework of the resource hosts. Due to the importance of biodiversity as a global public, and to the geographical mismatch between the locations of diverse

biological resources and many of the beneficiaries of biodiversity conservation, there is a need for a mechanism that can do this at the global level.

An effective institution must provide some manner of assurance of a permanent future flow of benefits if it is to impact upon the investment decisions of hosts. This is because investment decisions are decisions regarding assets and the anticipated flows regarding them; a host will only deviate from its perceived first-best investment path if the present value of the entire flow of future net benefits from such an alteration would appear to warrant it. Therefore, in order to have a permanent impact on decision making concerning the selection of development paths, it is necessary to make an impact on the perceived benefits from alternative pathways into the future, not just at the present time.

In this view a GDM can take any form that will enable: a) the ongoing and continuing transfer of values; b) from the demanders of biodiversity or biodiversity-associated goods and services; c) to those hosts who make the choices regarding assets (usually lands) that are capable of supplying them. Such a mechanism does not currently exist to protect the global values of biodiversity.

## **2.6 Support of the CBD for developing a GDM**

COP-9 gave a strong mandate for the development of a financial mechanism for biodiversity conservation at the global level. In implementing the programme of work on incentive measures, COP-9 decided to put more emphasis on, amongst others, “*studies on approaches to develop markets and payment schemes for ecosystem services at local, national and international levels, their advantages as well as potential limitations and risks, and their potential implications for biodiversity and indigenous and local communities*” (Decision IX/6, para 4 (d)). COP-9 also invited national, regional, and international organizations and initiatives to undertake, and requested the Executive Secretary to encourage, further studies on payments for ecosystem services and other positive incentive measures at local, national, regional and international levels (ibid., para 15). With regard to business engagement, COP-9 called for improving actions and cooperation for enhancing the engagement of the business community (IX/26, para 1).

Moreover, the decision on financial resources is very relevant, in particular the adoption of the strategy for resource mobilization contained in this decision (decision IX/11 B). Goal four of the strategy is to “*Explore new and innovative financial mechanisms at all levels with a view to increasing funding to support the three objectives of the Convention*”, and refers to PES in sub-goal 4.1 (“*To promote, where applicable, schemes for payment for ecosystem services, consistent and in harmony with the Convention and other relevant international obligations*”). There are also activities on biodiversity offsets (4.2) and innovative sources of international development finance (4.5).

Para 9 of decision IX/11 B maps out a process for further work on goal 4 of the strategy for resource mobilization and this process provides an entry point for feeding subsequent work on a GDM into the CBD process:

(a) Requests the Executive Secretary to prepare a document on policy options concerning innovative financial mechanisms, with inputs from regional centers of excellence in a geographically balanced way and forward it to the Ad Hoc Working Group on Review of Implementation of the Convention;

(b) Requests the Ad Hoc Working Group on Review of Implementation of the Convention to identify a series of options and policy recommendations concerning innovative financial mechanisms, based on the above information and the submissions received from Parties in response to the invitation contained in paragraph 6 of the present decision; (paragraph 6 reads: Invites Parties to submit views on concrete activities and initiatives including measurable targets and/or indicators to achieve the strategic goals contained in the strategy for resource mobilization and on indicators to monitor the implementation of the strategy)

(c) Requests the Ad Hoc Working Group on Review of Implementation of the Convention submit the results for consideration by the Conference of the Parties at its tenth meeting.

The Working Group on Review of Implementation is tentatively planned to take place in May 2010, approximately 5 months prior to COP. This provides a timeline for the development of a firm proposal, incorporating some time for governments to further reflect on the idea and their position after a first round of formal negotiations.

### **3 Lessons from existing mechanisms**

#### **3.1 Overview**

This section looks at current experiences with mechanisms that have some features in common with a potential GDM. Here we first examine the international financial mechanism developed under the Kyoto Protocol – the Clean Development Mechanism (CDM). Then we look at the private guidelines proposed under the Business and Biodiversity Offsets Programme (BBOP) and the national regulations developed in several individual states. This represents a very brief examination of experiences with similar instruments. It draws on the much more extensive discussion of existing policy mechanisms in the Background Paper, and highlights the ways in which experiences with other mechanisms can provide information relevant to the practical implementation of a GDM.

In each instance, we have placed the particular mechanism within a common framework, consisting of four constituent parts:

- a) aggregate development constraint (to generate demand);
- b) certification authority and procedure;

- c) exchange and marketability criteria or procedure; and
- d) monitoring and enforcement mechanism.

These four parts are meant only to render the various mechanisms are readily comparable and contrastable – in order to illustrate the range of choices that are available to policy makers in generating a GDM. They provide the framework for a discussion on “the development of a GDM”.

### **3.2 The Clean Development Mechanism (CDM)**

The Clean Development Mechanism (CDM), defined in Article 12 of the Kyoto Protocol, allows a country with an emission-reduction or emission-limitation commitment under the Protocol (Annex B Party) to implement an emission-reduction project in developing countries. Such projects can earn saleable certified emission reduction (CER) credits, each equivalent to one tonne of CO<sub>2</sub>, which can be counted towards meeting Kyoto targets.

***Aggregate constraint and demand for permits.*** A key consideration for the development of a financial mechanism is how to ensure that demand exists for the credits produced by environmentally beneficial investments. The incentives under the CDM are provided by the aggregate restrictions on total emissions agreed in the Kyoto Protocol. The demand for CER credits depends on the “gap” between countries’ emission commitments and actual emissions (Ellis et al 2004). These commitments create a market for CER credits that would not exist if all emissions were allowed (as was the case prior to the agreement). The effect is that the CDM provides benefits to those developing countries that reduce emissions, in order to increase the supply of the permits/credits available to sell, as well as allowing flexibility for developed countries in the way they meet their emissions targets.

***Certification authority and process.*** The certification process for emission-reduction projects is crucial to the effectiveness of the mechanism. There is value to allowing a credit or permit to be exchanged (in lieu of emission abatement) only if the credit or permit is certified to represent a genuine investment at another site. The certification authority is the agency responsible for implementing the process that results in certification. The certification process is that which is required in order to achieve this.

Under the CDM, all projects are voluntary, but they must be approved by the Designated National Authority (DNA) of each party involved in order to receive CER credits. These DNAs are generally the Environment Ministries of countries participating in the CDM. The host DNA is responsible for certifying that the project will contribute the level of reduced emissions that is claimed.

The non-host DNA must also ensure additionality, both in the sense that the project would not have otherwise taken place, and that the project leads to a reduction in carbon emissions relative to a baseline. Additionality can be demonstrated by the project proponent either using an existing methodology that has been approved by the Executive

Board of the CDM, or propose a new methodology (which must then be approved). In practice, most use an existing approved methodology.

***Marketability and exchange of rights.*** The CDM allows exchange of rights for emissions in any developing country to any developed country that is subject to a constraint. An important difference between greenhouse gas reductions and biodiversity conservation is that, while the benefits of emissions reductions are the same regardless of the source, the value of biodiversity conservation is highly specific to its location and the precise type and condition of habitat conserved. The result of this is that a mechanism that aims to allow losses of biodiversity in one location to be offset with increases in another location has the potential to be considerably more complicated to verify because the comparability of trades must be assessed, as well as the additionality of new projects.

It is also crucial that a financial mechanism provide an assured flow of future funding to encourage alternative development paths. One significant issue regarding CDM is that the poorest countries, who have difficulty attracting standard forms of investment, also have greatest difficulty attracting CDM investment on account of institutional weaknesses. The conditions necessary for attracting CDM projects include stable political regimes, strong legal environments for contracts and proven enforcement capabilities, macro-economic stability, availability of pools of skilled workers, institutional capacities and other sources of human capital (Ellis et al. 2007). As a result, emissions-reducing investments are concentrated in a small number of large, relatively wealthy countries such as China, Brazil and India.

This points to several potential problems for a GDM. First, conservation activities might concentrate in particular locations or ecosystem types that can be obtained and managed at lowest cost (including transactions costs), in addition to the institutional reasons that have resulted in concentration under the CDM. Also, since biodiversity is an important system spatially, it is important to incorporate considerations of spatial impacts in any sort of exchange mechanism. These problems may be addressed via the distribution of conservation rights in relation to: a) their lands available for development; and b) the relative value of those lands for biodiversity. Under the CDM, projects may be allocated by the proponent, and this may result in the problems with concentration indicated above.

***Monitoring and enforcement.*** In order for reductions to be effective, they must be monitored and enforced and this requires some amount of governance to accomplish. The validation of proposed CDM projects and the project-level monitoring and certification of emissions reductions are carried out by Designated Operating Entities (DOE), which are private organisations that have been accredited by the Executive Board of the CDM.

The DOEs are in turn monitored through regular scheduled and unscheduled surveillance visits. These are carried out on behalf of the Executive Board by CDM Assessment Teams, whose members are drawn from a database containing a roster of experts maintained by the CBD Secretariat. DOEs must have their accreditation renewed every three years, and accreditation may be suspended or withdrawn if they do not meet the necessary standards of performance. If they are found to have issued excess CERs, the

DOE must acquire and transfer an amount of reduced tonnes of carbon dioxide equal to the excess CERs issued, as determined by the Executive Board, to a cancellation account maintained in the CDM registry by the Executive Board.

The multi-level monitoring process of the CDM points to the need for an overarching institution that provides some manner of long-term assurance that the commitment will be undertaken. In the case of the GDM, conservation is a commitment that must be for a very long period of time, if not forever. This will require more consideration than has occurred in the case of the CDM.

### **3.3 Voluntary Offset Programmes (e.g. BBOP)**

In recent years, both private and public organisations have realised the benefits from the implementation of voluntary investments that offset the negative impacts on biodiversity of major infrastructure projects. This has resulted in various approaches to “biodiversity offsets”. The demand for such offsets has also produced a demand for a framework within which they might occur. One initiative that attempts to provide a systematic framework for voluntary offset activities, as well as to encourage their use, is the Business and Biodiversity Offset Program (BBOP). This is a partnership between companies, governments and conservation experts, aiming to use pilot projects to demonstrate the practical potential for using biodiversity offsets and to test a ‘toolkit’ of best-practice methodology. The specific activities that have been carried out, both through BBOP and by individual companies, are described in the Background Paper.

Some of the basic approaches developed within the BBOP framework are as follows:

***Aggregate constraint.*** In the case of the CDM, demand for investment in emissions reducing projects in developing countries was generated through the cap on total emissions of greenhouse gases. In contrast, a voluntary offset programme does not automatically generate incentives for the private sector to participating in offset activities. As a result, there is a need for some manner of self-imposed constraint or universally accepted offset principle in order to generate an ongoing demand for biodiversity offsets.

BBOP operates under the latter notion, and encourages the adoption of a general principle that will create demand for offsets. The principle employed to generate demand for offsets under this programme is termed *no net loss*. The implication is that there should be no development without an offsetting conservation project that results in a new commitment to biodiversity conservation.

***Certification Authority and Process:*** As BBOP is a voluntary mechanism, it does not provide a third party certification process. It does however provide principles for the design and implementation of a valid biodiversity offset. These indicate that the process should be public, and its results should be should be released in a transparent and timely manner. The process also involves ensuring that the biodiversity offset is a commitment to compensate for significant residual adverse impacts identified after appropriate avoidance, minimization and on-site rehabilitation measures have been taken according to the mitigation hierarchy.

Other principles include a requirement that the design and implementation of a biodiversity offset should be a documented process informed by sound science; should be designed and implemented in a landscape context to achieve the expected measurable conservation outcomes taking into account available information on the full range of biological, social and cultural values of biodiversity and supporting an ecosystem approach; and should achieve conservation outcomes above and beyond results that would have occurred if the offset had not taken place.

**Marketability and exchange.** In the BBOP framework, offset sites are selected on a case by case basis (the following section will discuss the alternative method of offset credits). This involves a comprehensive assessment of the biodiversity components that must be offset in order to satisfy the goal of ‘no net loss’ of biodiversity. This includes both the pattern of biodiversity within the landscape, and the ecological processes supported by the particular site. The selected offset site may then either be similar to the project site, or provide equivalent benefits at the landscape level, fitting in with any regional conservation plans in the host country

Another important question for any offset scheme is how to quantify the losses and gains in biodiversity to ensure that a minimum of ‘no net loss’ is achieved. The BBOP guidelines specify that the aggregate impact of a project with offset should not detract from the persistence of species’ populations, their chances of survival, or their retention in the landscape. Similarly there should be no net loss in the availability of and access to suitable habitat for individual species, or the persistence of recognisable assemblages of species (ecological communities).

The BBOP approach to measuring losses and gains in biodiversity is based on a comparison with benchmarks at the level of the biotope, species habitat or species population. For biotopes and species’ habitat, equivalence of impacts and offsets is calculated on the basis of ‘habitat hectares’, taking into account area, type and quality as measured on the basis of key attributes. To measure quality, a benchmark example of a healthy or pristine version of the biotope or habitat is selected, and used to define reference levels of various attributes. The project site and offset site are then given scores according to their current quality with respect to the chosen attributes relative to the benchmark example, and for their expected quality after the project and the offset. The losses and gains are measured by the expected changes in the scores over time, accounting for the risk that some outcomes may not be obtained.

Finally, it is recognised that there are situations where residual impacts cannot be fully compensated for by a biodiversity offset because of the irreplaceability or vulnerability of the biodiversity affected.

**Monitoring and enforcement.** It is necessary to ensure that offsets are implemented and managed effectively. This requires the designation of a managing entity, which may be the developer themselves, the local government, a local or international NGO, or a newly created institution. It also requires the creation of a long-term funding mechanism to ensure the permanence and sustainability of the biodiversity offset. One popular instrument for long-term funding is the *conservation trust fund*, which can both provide

the necessary finance over time, and participate in the management of the conservation site. Such funds establish a trustee organization responsible for overseeing the administration of the project for the life of the fund.

The last major management activity is the monitoring and enforcement of the proposed offset activities. This requires the measurement and evaluation of changes in both implementation and outcome indicators over time. BBOP does not currently have a third party monitoring process, but it is recognized that this would enhance the credibility of the biodiversity conservation activities. The BBOP principles indicate that the design and implementation of a biodiversity offset should be based on an adaptive management approach, incorporating monitoring and evaluation, with the objective of securing outcomes that last at least as long as the project's impacts and preferably in perpetuity.

### **3.4 National Biodiversity Offset Programmes with Banking**

In addition to existing voluntary mechanisms for offsetting the impacts of development on biodiversity, a number of countries have implemented compulsory offset mechanisms at the national level. These include wetland and habitat banking in the US; Legal Forest Reserves (LFR) in Brazil; and the BioBanking scheme in New South Wales, Australia (as well as similar programmes in other Australian states). These programmes are discussed more extensively in the Background Paper.

*Aggregate constraint.* As discussed so far, in order to have a compulsory offset programme, it is necessary to begin with regulations that place some form of limit on development activities which damage biodiversity. This may also be viewed as setting a baseline for the amount of biodiversity loss that is permitted.

The BioBanking system described above provides one example of how a baseline may be set, with regional conservation plans containing green-, amber- and red-light areas for development, based on the level of biodiversity values. Development may take place in “green-light” areas without any requirement to offset; in “amber-light” areas, development requires a rule-based method to determine the likely biodiversity loss, which must be offset; and “red-light” areas are the targeted locations for restoration activities.

As an alternative example, the EU Habitats Directive calls for an ‘appropriate assessment’ of any plan or project likely to have a significant effect for a Natura 2000 site. The general rule is that authorisation can only be granted to plans and projects not affecting concerned sites. However, there are exceptions to this rule, specifically in cases where ‘in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature’. In these situations, ‘the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected’.

Within the Brazilian LFR system, the baseline is generated by regulation stating that every rural landowner is required to maintain a minimum proportion of their land under natural vegetation (with the proportion varying by region). This provides a cap on the

total amount of land conversion that can take place, and therefore generates demand for the conservation of natural vegetation because those who wish to convert greater areas of land must purchase LFR credits. The US Endangered Species Act generates demand for conservation in a similar manner, through prohibiting development on any land that hosts an endangered species, unless the impacts are offset through improvements to habitat elsewhere.

***Certifying authority and process.*** There are advantages and disadvantages to state-based biodiversity regulation. Under these state-based regimes, the implementing authority is an agency of the government concerned, and the processes must be public and accountable – at least to the extent that the state concerned provides for such. However, since these are domestic regimes, they do not extend authority beyond the boundaries of the state concerned, nor do they provide for exchange or offsets beyond state boundaries.

Some of the issues that must be addressed for the implementation of an effective compulsory offset mechanism are similar to those faced by a voluntary mechanism. For instance, the biodiversity impacts of a proposed project must be comprehensively assessed; the comparability of the gains in biodiversity from the offset and the losses from the project must be ascertained; and the additionality of the offset must be ensured and monitored. However, in addition to these requirements, a compulsory mechanism must also include regulations specifying which development activities are permitted, which are not permitted under any circumstances, and which are permitted as long as their impacts on biodiversity are offset by improvements elsewhere.

***Marketability and exchange.*** Some of the state-based systems have the most innovative and comprehensive approaches to the exchange of development rights between sites. These systems operate by enabling some owners to undertake specific commitments to conservation, and then “bank” these commitments for sale to others who need to release their development constraints.

Within the BioBanking framework applied in New South Wales, landowners and other entities can manage land in order to maximize the value of biodiversity, and receive credits for doing so. These credits can be sold to developers to offset their activities. The number of credits assigned to a site is calculated using the BioBanking Assessment Methodology, and is a function of the ecological value of the site and its importance within a landscape context. Sites can obtain ecosystem credits, based on the vegetation on the land; and species credits, based on the presence of targeted species.

In terms of ensuring comparability of losses and gains in biodiversity, programmes such as the Brazilian LFR and the US wetland banking face a simpler problem than other programmes because they are limited to single ecosystem types. Furthermore, LFRs are limited to preferably the same watershed, and failing that, the same river basin or State. However, constraining the spatial or legal territory over which exchanges may occur is certain to raise the costs of the programme, and may also limit its conservation impact. Firstly, a wider trading domain can result in the protection of the highest quality lands, which may have both lower opportunity costs and higher ecological benefits (Chomitz et al. 2004). Secondly, Shabman and Scodari (2005) find that limiting the sale of wetland

credits to a single US state (as well as a single ecosystem type) constrains the potential of the market for credits because the availability of suitable lands for conservation decreases over time.

An alternative to exchanging a loss of a particular type of ecosystem for a gain in the same type of ecosystem, within the same geographical area, is demonstrated by the conservation banking system associated with the Endangered Species Act in the US. Within this scheme, credits are awarded for the protection of designated species. The loss of habitat for a particular species must be compensated for with an increase in habitat for the same species. A credit ratio is assigned to both the conservation bank and the purchaser of the credits, each reflecting the ecological value of the habitat, and each based on the judgement of the awarding agencies. The result of this is that on the one hand, it provides the flexibility to award high ratios to particular areas of land in order to encourage the banking of those sites. However, the bank owner has incentives to inflate the ecological value of the land while the mitigation seeker is motivated to minimise the value of their site. As a result, impact assessments may assign lower credit ratios than surveys to support banking agreements, which would mean that when the two are matched up there may be a net loss of ecological value. A caveat to this is that the benefits of conservation on larger areas of land and ensuring appropriate protection in perpetuity may outweigh losses resulting from imprecise credit ratios.

***Monitoring and enforcement.*** Of course one of the natural advantages of building upon the state governance structure is the inbuilt capacity for monitoring and enforcement. For example, states in Australia make reference to GIS and satellite based systems of monitoring to patrol land uses. Existing laws for administrative monitoring and enforcement may be accessed to enforce the commitments to conservation.

Similarly, The Brazilian LFR requirements are monitored using satellite data on fires and deforestation from the National Space Agency, in combination with maps of reserve areas and field inspections by the environmental agencies. The sanctions include fines, embargoes, seizure of goods and arrests, although the system of enforcement is constrained by relatively limited resources.

## **4 Proposal for a Green Development Mechanism**

### **4.1 Features of the proposed GDM**

This section proposes a potential structure for a GDM that would address the underlying drivers of biodiversity loss at a global scale. It also examines the roles of different stakeholders in the implementation process. In the following section, a programme of work for the more detailed development of the mechanism is set out.

***Comprehensive GDM.*** The goal of a fully comprehensive Green Development Mechanism for biodiversity conservation would be: 1) to cap all further development (in the sense of conversion of natural systems); 2) to distribute the capped level of

development rights; and 3) to create a market in these rights as a means for compensating communities for conserving biodiversity.

In this way, development rights become an instrument for generating the marginal value of biodiversity. Any demanders of biodiversity may enter the market and purchase development rights from the holders, driving the price of biodiversity up to their marginal willingness to pay. Any demanders of development must pay the marginal value of biodiversity in order to acquire the right to develop. The market for development rights should clear where the marginal value of biodiversity (represented by willingness to pay by any individual, group or state) was equal to the marginal value of development.

Following the example of the emission trading system of the Kyoto Protocol, this comprehensive GDM could take the form of a global cap-and-trade system. The cap might take the form of a global restriction on conversion-based development, and an agreed distribution of quotas to individual states or communities. States or communities could then trade their quotas to those demanding either development rights, or further biodiversity conservation, or they could simply exercise their quotas.

***Partial GDM.*** Assuming that the pursuit of a fully comprehensive and international framework for global public good provision is some way off in the future, it is possible to formulate a less than global financial mechanism that might take a less-comprehensive form but still with the object of transferring some values to some of those communities hosting biodiversity.

A partial mechanism would attempt to create rights in biodiversity-holding communities, and create systems for paying these communities to invest in their biodiversity. The difference with the comprehensive mechanism lies in the absence of any universal system of rights distribution. Furthermore it would operate to transfer some part of the values of biodiversity to some communities hosting biodiversity, rather than attempting to generate a complete market in biodiversity's total economic value.

Simply to render the remainder of our discussion concrete, here we focus upon the formulation of a partial system in which organisations undertaking activities such as land conversion offset those impacts through increased conservation elsewhere. This ensures that public and private entities take account of the social costs of development projects in addition to the private costs and benefits. Furthermore, it introduces flexibility into biodiversity conservation by allowing development activities to go ahead where necessary, but still (assuming an effective mechanism) achieving conservation goals. The proposed mechanism would follow existing voluntary and regulatory guidelines by placing offsets within a hierarchy of avoiding, minimising and mitigating harm to biodiversity prior to considering an offset for any residual harm. This is necessary to ensure that the presence of an offset instrument does not encourage greater damage to biodiversity than would occur in its absence.

From the point of view of the suppliers of biodiversity, the proposed GDM also provides incentives to maintain land in an undeveloped state. This is particularly clear if the requirement to offset losses of biodiversity is combined with a system of biodiversity

banking. This allows profit-making or charitable organisations to purchase and maintain land of high ecological quality, and sell biodiversity credits based on the protection of the biodiversity on the land. It involves the certification of areas of protected land that can be used as the basis for selling biodiversity credits to those with a need to offset their activities.

Land can be certified on the basis of the ecological quality of the habitat, or the presence of particular species that are endangered or considered to be important. As in the existing national banking schemes described in the previous section and in the Background Paper, land that is in better ecological condition, or that contains many important species will obtain more credits than the same area of land of poorer quality. In addition, the certifying agency may give more credits for connected areas of land that contribute to a single large area or an ecological corridor between protected areas.

The key importance of biodiversity banking is that it generates an implicit market for unconverted lands for purposes of biodiversity conservation. The prices paid for banked lands become the means for expressing the demand for biodiversity conservation. And these banked lands may be acquired by developers and conservation groups alike, enabling the expression of the willingness to pay for either development or biodiversity conservation.

The proposed mechanism may be voluntary or regulatory, and the case for each is discussed in the following section. A regulatory system requires a cap on at least some development activities, and an initial allocation of the rights to convert land or otherwise harm biodiversity, as discussed above.

In addition, both types of system require the following components:

***A constraint on biodiversity loss.*** This is the component that generates a demand for biodiversity. In a regulatory system, this will be established by a cap on some types of development activities. In a voluntary system, this will be established by the pronouncement of a “universal principle” setting out the impacts to be avoided in the course of development, e.g. ‘no net loss’ or ‘required gain’ in biodiversity commitments.

In either case it will be important to define the nature of the activity or activities to be regulated. This definition may include specification of: the nature of the lands or habitats that will be managed; the sectors that participate; the types of economic activities that should be offset; and the locations concerned.

***Certifying authority and process.*** This establishes the identity of the authority that will certify when development has met the requirements of the process. Such an authority may be governmental or nongovernmental, but should in any case operate within a framework established by a governmental authority. It is extremely important to have a credible agency to monitor, certify and sanction the system.

In addition, the process must meet basic standards of transparency, principled decision making and fairness in order to be accepted as a regulatory process. This must include

the specification of a method for certifying valid offsets for development activities that take place. This would involve the specification of the types of activities that can generate credits for sale; the value of the credits generated (based on a biodiversity metric); and the terms under which the credits may be used to offset the development activity.

***Exchange of rights and marketability.*** There is the need for a methodical approach to comparing losses and gains in biodiversity across sites. This should go beyond simple area-based measures, and account for variability in ecological quality at alternative sites.

It is also necessary to have agreed standards regarding permissible trades across geographical boundaries and ecosystems. In order to ensure the protection of particular natural assets, certain trades may not be allowed, or alternatively, the ratio at which credits may be bought and sold can vary across different types of exchange.

***Effective monitoring and enforcement*** The institutions used for monitoring and enforcing the GDM must have the capacity to do so for the full period over which it is desirable for conservation commitments to run. This may be a set number of years, but it is more likely to be an indefinite commitment period.

## **4.2 Relationship to the CBD**

The legal framework under which the GDM might operate could emanate from a resolution of the CoP of the CBD. This has two immediate advantages. First, it would provide the basis for a parallel structure of laws in all states party to the CBD (and thus creating the opportunity for parallel state-based certification and enforcement mechanisms). Second, it would provide the basis for a system that spans a total area equal to the sum of all states party to the CBD. For these reasons there are significant advantages to taking this proposal forward within this forum.

In addition, there is an ongoing role for the CBD to provide the oversight of the states taking part in any form of GDM, and providing communication between the parties in relation to the: a) certification process; and b) monitoring and enforcement processes. Necessary activities include assessment of damages to biodiversity; certification of acceptable credit-generating offset activities and credit values; specifying allowable offsets/trades; and monitoring and enforcing conservation outcomes. Most of the individual elements of these activities may be carried out at the national level or by NGOs or accredited businesses. However, as discussed above, it is highly important that these tasks are overseen by an institution with widespread external credibility, and that the processes are all transparent and credible. The oversight and communication structure within the CBD can provide the basis for supporting the individual systems.

## **4.3 Roles of other stakeholders**

In addition to the role of CBD processes for the negotiation and implementation of a global GDM, there would also be requirements for the involvement of the private sector, NGOs and individual national governments.

For a GDM such as that proposed here to be effective requires the active participation of the private sector. This is particularly the case with a voluntary instrument. While a regulatory instrument creates demand for biodiversity credits, and ultimately biodiversity protection, through a cap on total development, a voluntary instrument relies on private companies adopting a “universal principle” of offsetting biodiversity losses and purchasing biodiversity credits when such losses are unavoidable. If demand is low, prices for conservation credits may fall below the opportunity costs, while if there is no demand, there will be no incentive for conservation within the GDM mechanism.

The private sector also has a role in the supply of biodiversity conservation. The proposed GDM is based on the creation of conservation banks by the private sector. These may be set up by non-profit organisations or for the purpose of earning profits through the sale of biodiversity credits.

National governments will be required to recognise the contractual obligations to conserve land for biodiversity in return for the sale of biodiversity credits. For the GDM to operate effectively, they will also need to support the use of the credits to offset damages generated by development activities.

## **5 Issues to be addressed for the implementation of a GDM**

### **5.1 Voluntary vs. Regulatory Mechanism (A Prefatory Question)**

The first question to be addressed is whether the proposed GDM should be introduced as a voluntary or a mandatory mechanism.

There are two considerations for a voluntary mechanism: First, the developers must be motivated by a self-imposed development constraint rather than a governmentally-imposed one. This relies upon the goodwill and reputation of the developer, and provides a relative return to those developers who are less accountable and less transparent in their dealings. A self-imposed development constraint is a cost of business, and it is difficult to sustain in a competitive industry unless the goods are certified and demand is differentiable.

Secondly, the regulatory authorities for voluntary schemes are generally voluntary agencies. This has the advantage that these agencies are able to cross political boundaries, and gain the advantages of managing biodiversity across boundaries. It has the disadvantages of relying upon the reputation and permanence of voluntary agencies, which are crucial characteristics in regard to a regulatory matter as long-lasting as biodiversity conservation. This latter issue could be overcome if oversight of the certification and monitoring process was carried out through an institution such as the CBD.

A mandatory instrument has the advantage that, as long as the constraints on development activities that harm biodiversity are sufficiently stringent, demand for

biodiversity credits, and by extension conserved land, is generated directly by the GDM. However, the transactions costs of implementation are considerably higher than for a voluntary mechanism because national governments must agree to both an aggregate cap on total global development activity and on the distribution of rights to develop.

**Questions:**

- Should the proposed constraints under the GDM be voluntary or mandatory?
- In either event, how should the proposals be promulgated? What should be the roles of the following agencies in terms of making laws and regulations: a) CBD; b) member states; c) implementing agencies?

## **5.2 Aggregate Constraint on Biodiversity Losses**

Establishment of an appropriate form of constraint is relevant for either a voluntary or regulatory mechanism. Many existing schemes have implicitly selected an aggregate designating current levels of biodiversity, with the specification of ‘no net loss’ or ‘net gain’. However, the baseline may allow for some loss of biodiversity over time. For example, in the case of a regulatory mechanism, an aggregate limit on the total losses of biodiversity (or alternatively, the total amount of biodiversity-damaging economic activity) set. This is then the aggregate development restriction that is imposed in order to afford the public good.

As discussed above, a comprehensive GDM would cover impacts on all aspects of biodiversity, in all locations, and from all sources. In contrast, a partial GDM may address a subset of biodiversity impacts resulting from a subset of economic activities. As a result, it is necessary to specify which impacts and which activities will be covered by the GDM. Is it to be partial or comprehensive?

For a mandatory instrument, once the aggregate quota on development is known, there are a number of ways to distribute this quota, and to enforce the allocation. Distribution of quotas may be pursued in several ways: a) grandfathering of rights; b) pro rata rights; c) auctioning of rights; or d) any other criterion of “fairness”.

The existing financial commitments under Article 20 of the CBD (in particular Article 20.2) would have an important bearing on the initial distribution of rights. Article 20.4 states that: *“The extent to which developing country Parties will effectively implement their commitments under this Convention will depend on the effective implementation by developed country Parties of their commitments under this Convention related to financial resources and transfer of technology and will take fully into account the fact that economic and social development and eradication of poverty are the first and overriding priorities of the developing country Parties.”* Related to this, there is potential for differentiated restrictions on biodiversity loss among countries, in line with differentiated responsibility, as was agreed for the Kyoto Protocol.

The initial distribution and the ultimate allocation of quotas may be very different things depending upon the transferability of the quotas. Efficiency of the ultimate allocation (with regard to demanders) is enhanced by making the quotas transferable, and by facilitating the markets in the transferable quotas. However, when there are spatial impacts implicit within the use of quotas, the social benefits provided from the scheme might vary substantially between the initial distribution and the ultimate allocation. For example, if the initial distribution included recognition of the benefits that might be generated from that spatial configuration of development, then any subsequent re-allocation must also alter that set of benefits.

***Questions:***

- What should be the nature of the constraint on biodiversity loss? How should it be specified? What activities should it include?
- How should allowances or endowments of biodiversity losses be distributed across countries? How should they be allocated?

### **5.3 Designation of agencies responsible for certification and monitoring**

It is critical to the success of the GDM that the agencies certifying the trades made within the mechanism, and those monitoring the outcomes, are perceived to be credible. They must also have the capability to impose some form of meaningful sanctions on those who misuse the offset system.

Even if the CBD is the institution responsible for oversight of the GDM, it will remain necessary to determine the nature and identity of the implementing agencies. However, One or more additional agencies may be required for the day-to-day activities involved in:

- certifying biodiversity credits assigned to protected or restored land
- assessing likely biodiversity damages from development activities requiring offsets
- approving trades/setting exchange rates
- monitoring outcomes
- sanctioning non-compliance

These activities may be carried out at the national level, as in the CDM, or they may be carried out by a single international body with sanctioning by virtue of disclosure or secondary enforcement (by member states). The important characteristics of the process include: transparency, accountability, and perceived fairness.

### *Questions:*

- Which agencies should have responsibility for certification, monitoring, and enforcement of the GDM?
- What division of labour should exist between public and private sectors in these various functions?

## **5.4 Certification Process**

The process usually relies heavily upon scientific assessment and techniques, in order to attempt to assess some manner of commensurability between biodiversity habitats. It is possible that these processes might rely on broader inputs and information, such as community preferences and indigenous rights, as in a general land-use planning process. A first question to be considered must be the nature of the process that certifies a proposal, and what information is allowed.

When science is a primary method for assessment, the process remains complex. Natural resources, even within the same ecosystems, will vary in quality over space and time. This means that measuring biodiversity change using, for example, simple area-based measures will not be sufficient to ensure that biodiversity losses are comparable with the increases achieved through the operation of the GDM. Instead, some form of biodiversity index, accounting for both quantity and quality is required.

A range of methods have been used in practice to measure biodiversity losses and gains. Many of these are described in the Background Paper, which reviews existing mechanisms for biodiversity conservation, primarily at the national level. One example is the evaluation of ecological value carried out for the Australian BushTender programme. A Field Officer assesses the Biodiversity Significance of the land by identifying the type and extent of native vegetation, the quality of the vegetation, and how it fits into the wider landscape. The site is compared with a benchmark that represents the average characteristics of a mature stand of the relevant vegetation type in fully natural condition. Existing databases and information from the landholder are used to determine the native plant and animal species habitat likely to be present. The Field Officer also calculates a Habitat Services Score, which is a measure of the improvements in the quality and security of native vegetation arising from management commitments and actions that are proposed as part of the management agreement. These measures are combined into a Biodiversity Benefits Index.

Alternatively, the REMEDE Toolkit, which has been developed for remediation of damages under the EU Environmental Liability Directive, uses Habitat Equivalency Analysis (in which units of habitat lost are replaced by gains in similar habitat), Resource Equivalency Analysis (in which specific resources such as numbers of fish or birds are replaced with increases in those resources at the remediation site) and Value Equivalency Analysis (in which remediation is based on the creation of resources of equivalent

monetary value to those lost) as different possible methods for determining the extent to which damages to environmental resources in general are compensated by improvements elsewhere (Lipton et al 2008).

With the exception of Value Equivalency Analysis, these methods rely on ecological information to determine the equivalency of losses and gains in biodiversity. However, it may also be relevant to consider wider economic and social impacts, particularly where the spatial distribution of the losses and gains is important.

***Questions:***

- What should be the nature of the certification mechanism: scientific assessment or broader political process?
- How should gains and losses in biodiversity be monitored and measured?

## **5.5 Exchange of Rights and Marketability**

A question that will have major impacts on whether a GDM is effective for biodiversity conservation is the extent to which trades are allowed across ecosystems and between geographical locations.

A fully tradable credit system would have important spatial implications (due to the different impacts of different areas of biodiversity) and so it may be important to design credits that are spatially differentiable. For example, it may not be considered viable or desirable to enable the trade-off of one development right based upon a hectare of coral reef for a development right based upon a hectare of temperate forest. Similarly, where elements of biodiversity are valuable because of their uniqueness (for example, the existence value of the Siberian Tiger), it may not be considered reasonable to exchange the loss of those elements for increases in more abundant components of biodiversity.

Even for individual elements of biodiversity, there may be larger benefits from ecosystems services provided by resources located near centres of population, but these are also likely to be subject to greater development pressure. Without restrictions on trades, the likely effect would be losses of biodiversity in populated regions and gains in remote regions, which could lead to an overall loss of value. Related to this, is the question of trades occurring across national boundaries. In addition to the likely differences in the types of ecological resources across countries, the existence of local, as well as global, benefits of biodiversity conservation mean that populations of certain countries will lose benefits of biodiversity, while others will gain. This will be of particular concern if those who lose biodiversity benefits do not gain from the corresponding development activity.

For these reasons, any system built upon offsetting development activities must also design the credit system to enable trading between equivalent rights, or at exchange rates

that represent differential benefits from different systems. This points to the likelihood of a more complex development rights system, with several levels or types of rights being created (and only enabling trading within levels), e.g. tropical forest rights, marine systems rights, wetland area rights, etc. If a spatially differentiable system is necessary, then the certifying agency must also certify trades as valid within the trading rules.

Although restrictions on trades and/or differential exchange rates are likely to be required, there is a cost to their use because as the number of restrictions increases, the functioning of the market is likely to decrease and the efficiency gains from a trading system will be reduced.

***Questions:***

- Are there particular trades across ecosystems and species, or across space, that should be prohibited?
- How should rates of exchange be determined for losses and gains in different types of resources or different locations?

## **5.6 Monitoring and Enforcement**

Commitments under the terms of the GDM must be monitored continuously for many years, if not eternity. This raises issues to do with the feasibility of substantial monitoring and enforcement efforts, across both space and time.

The character of the agency responsible for monitoring and enforcement must make available some means of punishing any un-met commitments. This requires consideration of how commitments across states might be enforced, and the credibility of the mechanisms available for doing so.

***Questions:***

- How should commitments be monitored?
- How can long-term commitments be enforced? What are the sanctions available, and the agencies that can be trusted, over a timespan of generations?

## **6 Future Programme of Work**

A key objective of the Expert Meeting on International Market-based Instruments for Financing Biodiversity Conservation is to agree a general approach for a potential GDM aimed at generating financial incentives to reduce biodiversity loss at the global level.

However, additional work will be required to determine the details of the implementation of the proposed mechanism. The questions that need to be answered through the future programme of work are those raised in the previous section. The work required to answer the questions will be planned by separate working groups as follows:

### **Workshop participants**

- Should the proposed constraints under the GDM be voluntary or mandatory?
- In either event, how should the proposals be promulgated? What should be the roles of the following agencies in terms of making laws and regulations: a) CBD; b) member states; c) implementing agencies?

### **Working group 1 – Constraint on Biodiversity Loss**

- What should be the nature of the constraint on biodiversity loss? How should it be specified? What activities should it include?
- How should allowances or endowments of biodiversity losses be distributed across countries? How should they be allocated?

### **Working Group 2 – Certification Process**

- Which agencies should have responsibility for certification, monitoring, and enforcement of the GDM?
- What division of labour should exist between public and private sectors in these various functions?
- What should be the nature of the certification mechanism: scientific assessment or broader political process?
- How should gains and losses in biodiversity be monitored and measured?

### **Working Group 3 – Exchange of Rights and Marketability**

- Are there particular trades across ecosystems and species, or across space, that should be prohibited?
- How should rates of exchange be determined for losses and gains in different types of resources or different locations?

### **Working Group 4 – Monitoring and Enforcement**

- How should commitments be monitored?
- How can long-term commitments be enforced? What are the sanctions available, and the agencies that can be trusted, over a timespan of generations?

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