

# Markets for Ecosystem Services

## A Potential Tool for Multilateral Environmental Agreements

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## **Acronyms**

CBD – Convention on Biological Diversity

CDM – Clean Development Mechanism

CITES – Convention on International Trade in Endangered Species of Wild Fauna and Flora

CMS – Convention on Migratory Species of Wild Animals

COP – Conference of the Parties

ECOSOC – United Nations Economic and Social Council

FONAFIFO – Fondo Nacional de Financiamiento Forestal

GEF – Global Environment Facility

IGOs – inter-governmental organizations

LULUCF – land use, land-use change and forestry

MA – Millennium Ecosystem Assessment

MBIs – market-based instruments

MDGs – Millennium Development Goals

MEAs – multilateral environmental agreements

MES – markets for ecosystem services

NGOs- non-government organizations

PROFAFOR – Programme FACE de Forestacion

TDRs – transferable development rights

UN – United Nations

UNCCD – United Nations Convention to Combat Desertification

UNCTAD – UN Conference on Trade and Development

UNDP – United Nations Development Programme

UNEP – United Nations Environment Programme

UNFCCC – United Nations Framework Convention on Climate Change

UNFF – United Nations Forum on Forests

UPP – user pay principle

WTO – World Trade Organization

## Executive Summary

Ecosystems provide many services from which people benefit that cannot be bought or sold in the marketplace, such as clean water and erosion control. Unfortunately government regulation has not been sufficient to protect these services. An alternative policy approach is to create and develop market mechanisms that would improve the way ecosystem services are used. These markets for ecosystem services (MES) are increasingly recognized as having an important role to play in the sustainable use of ecosystem services and, more recently, in reducing poverty. These instruments can generate financial resources, divert funds to environmentally-friendly technologies, create incentives for investment and increase the involvement of the private business sector in environmental management. In light of the deteriorating trend in ecosystems highlighted by the Millennium Ecosystem Assessment (MA), MES can be expected to take on an increasing role in providing incentives for conservation and the sustainable use of ecosystem services. Furthermore, there is a potential for using MES to enhance the implementation of multilateral environmental agreements (MEAs).

### *Background*

- Nearly two-thirds of the provisioning, regulating, supporting and cultural services provided by nature upon which human well-being is dependent are in decline worldwide.<sup>1</sup> These services—nature’s services or ecosystem services—have been used to such an extent as to jeopardize their capacity to continue providing benefits to human well-being. Furthermore, scenarios developed by the MA indicate that this downward trend will remain unchanged without unprecedented efforts.
- For many developing countries, the loss of ecosystem services will be a barrier to achieving the Millennium Development Goals (MDGs) to reduce hunger, disease and income poverty.
- Even if countries achieve the MDGs by 2015, the loss of ecosystem services will ultimately undo most of the benefits in the longer term.
- Although today’s technology and knowledge can contribute to minimizing the human impact on ecosystems, their potential is unlikely to be deployed fully until ecosystem services cease to be perceived as free and limitless and their full value taken into account.
- Although the benefits provided by services emanating from ecosystems are acknowledged by people—especially those related to regulating, supporting and cultural services—these services are unaccounted for, unvalued and therefore remain outside market domains.
- There have been successes in pricing provisioning ecosystem services through the creation of markets. This is largely due to the fact that ownership of these services can be easily established through property rights. However, it must be recognized that many of the prices for these services are still far from perfect because the damage caused to the environment, i.e., externalities, by the use of these services are still not internalized within pricing mechanisms.
- Establishing prices for regulating, cultural and supporting ecosystem services raises a serious challenge. Many of these services are public goods by definition. This means that these services are beyond the boundaries of private property rights. Therefore, new innovative

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<sup>1</sup> Millennium Ecosystem Assessment. 2005. *Ecosystems and human well-being: Synthesis*. Washington, D.C.: WRI, p. 1.

mechanisms are required. Can Market-Based Instruments (MBIs) such as transferable permits and auctions be used in this respect?

- It should also be acknowledged that in spite of the opportunities that MES present, they may also cause further ecosystem degradation and push some groups of people into destitution. The MA highlighted many instances whereby MBIs failed to achieve ecosystem targets, therefore requiring direct regulation by governments. Market-based approaches may not be feasible or even desirable for all ecosystem services, and when used their designs need to consider impacts on and information feedback loops from ecosystems and stakeholders.
- Even if markets can be created for some of the regulating, cultural and supporting services, supporting mechanisms may need to be created to ensure that the poor are not marginalized and/or excluded from:
  - the use of the services themselves; and
  - the financial benefits received from the sale of these services.
- Developing countries provide numerous services to the world—such as ecosystem services and the preservation of biodiversity—for which they are not compensated. For example, developing countries are proposing to submit themselves to the obligations of the Kyoto Protocol if they receive compensation for environment services.<sup>2</sup> This needs innovative financing to make it work. Markets for ecosystem services are one such mechanism.

### *Conclusions*

- The role of the public sector is critical for successful pro-poor MES. Governments have a role to play in facilitating and creating MES, managing transaction costs, and providing institutional structures so that these markets work efficiently and equitably.
- MEAs can also contribute towards the deployment of MBIs. As legally-binding instruments, they offer an appropriate institutional structure for supporting MBIs.
- MBIs can be useful mechanisms for mainstreaming MEAs within the broader sustainable development frameworks used in countries.

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<sup>2</sup> This is one of the key points made by Nobel Laureate Joseph Stiglitz at the 2005 ECOSOC Plenary.

## 1. Introduction

*Developing countries are providing enormous services to the world for which they are not compensated, such as the environmental services and preservation of biodiversity. One of those services is in the area of greenhouse gases. Measured by mechanisms included in the Kyoto Protocol, the value of the carbon services provided by the tropical countries exceeds \$30 billion a year. Developing countries now propose that they would submit themselves voluntarily to the provisions of the Kyoto Protocol if they received compensation for environment services. This needs innovative financing to make it work.*

*Joseph Stiglitz, Nobel Laureate in Economics<sup>3</sup>*

This plea by Nobel Laureate Joseph Stiglitz, at the June 2005 high-level UN Economic and Social Council (ECOSOC) meeting, to create innovative mechanisms to capture the value of environmental services<sup>4</sup> comes at a time when many developing countries are struggling to finance their poverty reduction strategies with limited resources and capacities. Using markets to capture the present “free good” aspect of many ecosystem services—especially those services offering global benefits—may offer one such innovative financing mechanism in addition to providing a possible solution to the degradation of ecosystems and the services they provide.

The Millennium Ecosystem Assessment (MA)<sup>5</sup> found that over 50 per cent of biomass assessed has undergone 20 to 50 per cent conversion to other land uses such as cropland and pasture land and is expected to undergo further conversion as the demand for ecosystem services increases in the future.<sup>6</sup> The MA also reports that 15 of 24 ecosystem services are presently being degraded. The potential for meeting future demand for ecosystem services is therefore in serious jeopardy and needs immediate action, particularly if the Millennium Development Goals (MDGs) are to be achieved.<sup>7</sup> This is especially true for the category of ecosystem services which the MA classifies as regulating, supporting and cultural services. These services, termed indirect by environmental economists as they are not used directly by individuals to enhance well-being, include flood regulation, water purification, pollination and environmental security uses.<sup>8</sup>

Many solutions have been proposed to halt and/or reverse the unsustainable use and degradation of these indirect-use ecosystem services. Some have been successful while others have failed. An

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<sup>3</sup> Joseph E. Stiglitz. “Cleaning up economic growth,” *The Economic Times*. (Friday, June 10, 2005).

<http://economictimes.indiatimes.com/articleshow/1137794.cms>

<sup>4</sup> Ecosystem services are the benefits people obtain from ecosystems described as provisioning, regulating, supporting and cultural services by the MA (MA 2005).

<sup>5</sup> The MA was a four-year study requested by former UN Secretary-General Kofi Annan in 2000 to undertake an assessment of global ecosystems.

<sup>6</sup> Millennium Ecosystem Assessment. 2005. *Ecosystems and human well-being: Synthesis*. Washington, D.C.: WRI.

<sup>7</sup> The links between ecosystem services and the various MDGs are not elaborated upon in this concept note. Such information is available from the MA report.

<sup>8</sup> Specifically, regulating services include benefits obtained from the regulation of ecosystem processes (ie., climate, water, etc.); cultural services incorporate the non-material benefits people gain from ecosystems through recreation, spiritual enrichment, etc.; supporting services are necessary for the production of all other ecosystems (i.e., nutrient cycling, water cycling, etc.). (See <http://www.greenfacts.org/glossary/def/ecosystem-services.htm>, accessed February 28, 2007)

assessment of response strategies, undertaken by the MA, highlighted the potential of markets to mitigate the loss of these ecosystem services.<sup>9</sup>

The potential of such markets for ecosystem services (MES) needs closer scrutiny however, as markets for indirect-use ecosystem services in particular have the potential for causing further ecosystem degradation and greater social inequity by pushing some groups of people into destitution. Experiences from the field highlight a need for a number of enabling conditions if markets are to be used to mitigate and/or reverse the degradation of ecosystems.<sup>10</sup> Empirical evidence also points towards the need for supporting institutions if economic instruments for ecosystem services are to be pro-poor, i.e., they would not cause or exacerbate poverty. This paper pays particular attention to: (i) the development of markets for regulating, supporting and cultural ecosystem services including biodiversity; and (ii) making these markets pro-poor.

This paper is basically presented in two parts. The first provides a general overview of MES. In this section, critical elements of MES will be presented followed by a brief description of some lessons learned from existing MES. Part two explores the potential of using MES as an effective tool for the implementation of multilateral environmental agreements (MEAs). The paper will end with a section on the challenges and opportunities of using MES.

## **2. Markets for Ecosystem Services: Some Critical Elements**

MES are defined as mechanisms that create a market for ecosystem services in order to improve the efficiency in the way the service is used. A market is defined as a mechanism that allows people to trade, normally governed by the theory of supply and demand; by allocating resources through a price mechanism those willing to pay a price for something meet those willing to sell at that price. Examples of MES include the establishment of carbon sequestration offsets, tradable development rights, tradable quota systems, eco-labelling and environment-certification and bio-prospecting, among others.

Economic theory tells us that declines in ecosystem services occur when institutional failures occurs. Market and governmental failures are the two most common institutional failures that contribute to ecosystem service degradation. Market failures occur when the market is unable to lead the economic process towards a social optimum.<sup>11</sup> This is caused by: (1) the failure of markets to emerge and allocate the correct prices for the environmental effects of economic activity; (2) when there is failure in the existing markets (caused by monopolies or oligopolies or a lack of property rights on a specific good); and/or (3) when markets fail to emerge because of the public good characteristics of some ecosystem services. Government failure on the other hand comes either through a lack of intervention and/or through inappropriate intervention.

This paper focuses on market failures. In very broad terms MES allow supply and demand forces to dictate the level of ecosystem service use. The underlying principle of MES lies in the user pay

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9 Millennium Ecosystem Assessment. 2005. *Ecosystems and human well-being: Biodiversity synthesis*. Washington, DC: Millennium Ecosystem Assessment/World Resources Institute, 2005, p. 86.

10 Millennium Ecosystem Assessment. *Responses Working Group ecosystems and human well-being: policy responses*. Volume 3: Findings of the Responses Working Group of the Millennium Ecosystem Assessment. Washington, DC: Island Press, 2005, xxi, p. 621.

11 OECD. 1994. *Managing the environment: The role of economic instruments*. Paris: OECD.

principle (UPP).<sup>12</sup> The rule under this paradigm is simple—pay as you use the ecosystem service. However, unlike normal commodities, the market is not able to determine the price of ecosystem services which are public goods. This is primarily due to the difficulty in assigning individual property rights to the service. The lack of a price-determining mechanism within markets suggests an important role for governments to play.

Therefore, contrary to popular belief, governments have a critical role to play if MES are to work effectively—from setting the price for charges/taxes to stipulating emission quotas for tradable emission permits to setting aside areas for conservation. In order to identify the “right” price, governments have to access the value of the ecosystem service. This is a non-trivial task because valuation studies which are used to find values of ecosystem services are difficult to conduct and rife with uncertainties.

In spite of the difficulties in designing MES, economists have argued for the use of these instruments for the following reasons:

- the system promotes the use of least-cost solutions based on a cost-benefit framework (economic efficiency) to supply the ecosystem service;
- it encourages the search for and application of new technologies to improve ecosystem services (incentives); and
- it encourages the sustainable use of ecosystem services.

MES work best when there are well-defined property rights over the ownership of the services. Ronald Coase argues that for goods or services to be bought and sold, these goods and services must have well-defined property rights to facilitate exchange.<sup>13</sup> In the case of MES, this would imply assigning definitive property rights for the respective ecosystem services even if many of these services exhibit public-good characteristics. The Catskill water market in New York is an example whereby private rights were created for the water purification ecosystem service provided by the Catskill mountain ecosystem. Another example of a MES at work is the carbon emissions trading market whereby producers of carbon can sell and buy carbon emission rights, i.e. permits. The main drawback or weakness with permits is the initial allocation. First, the number of permits must be determined. Second, who gets what and how many has to be decided. The issue of equity needs to be addressed. An open auction of the initial permit pool may exclude smaller firms from participating and subsequently drive them away from the market. Policy-makers must respond to the possibility of creating monopolies or oligopolies. The third issue revolves around transaction costs associated with the creation and maintenance of the emission market, which are largely ignored by many analysts who assume a perfect institution and zero transaction cost scenario in their analysis. While such analysis undoubtedly provides valuable insight into the advantages of these markets in addressing environmental problems, the next step requires some perspective on the amount of these transaction costs.

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<sup>12</sup> User pay principle (UPP) states that those who use an ecosystem service should pay for the use of that service in proportion to the extent to which they use it.

<sup>13</sup> Clem Tisdell. 1993. *Environmental economics: Policies for environmental management and sustainable development*. Brookfield: Edward Elgar, p. 192.

### **3. Ecosystem Services and Property Rights: Public and Private Goods**

A public good or service has two distinct characteristics that separate it from private goods or services. The first is non-excludability. The consumption of a commodity by one individual does not decrease the amount or level of that commodity available to another individual. Examples of ecosystem services exhibiting this characteristic include air, flood regulation, water purification and pollination, among others. The second definitive characteristic of public goods or services is non-rivalry. In this case, the use of a good or service by one individual does not imply that the good or service cannot be used by other individuals. In other words, all individuals have access to the good or service. Example of an ecosystem service that exhibits non-rivalry is the aesthetic value (cultural service) emanating from national parks.

Most regulating, supporting and cultural services have public good characteristics. This is one of the main reasons why markets have not evolved naturally for these services. Defining private property rights for flood regulation services, for example, is difficult to say the least. Moreover, the notions of some individuals having rights over a service like flood regulation which can affect many other individuals can be argued as being immoral. The same can be said for many life supporting ecosystem services like clean water, clean air and climate regulation, among others. The problem arises when the provisioning services ecosystems provide are private goods. For example, timber, agricultural products, genetic resources and water can be given property rights. However, the inter-linkages between ecosystem services make the assignment of property rights slightly more complex. The use of many provisioning services has a direct impact on the flow of regulating, supporting and cultural services. In most instances, these impacts are negative. Therefore, extraction of timber from forest at rates above a certain threshold will cause the decline in water regulation, flood regulation and erosion control. The extraction of timber from native forests will also have a detrimental impact on biodiversity.

This dichotomy between private and public good characteristics relative to provisioning services on one hand, and regulating, supporting and cultural services on the other hand make the assignment of property rights problematic. It is in fact the assignment of property rights over provisioning services that has been a key driver in the decline of regulating, supporting and cultural services. There is still another paradox that emerges from this concurrence of services. Economic theory suggests that if property rights are assigned, then there is an incentive for the owner of the right to use the resource or service in the manner that provides the highest utility. However, maximization of utility does not automatically imply sustainable use of the resource; and depending on the external environment, the owner may have cause to use the service until exhausted. The question arises as to how property rights can be assigned for provisioning services which will inadvertently encourage sustainable use such that the regulating, supporting and cultural services are not impaired and can be enjoyed by all individuals.

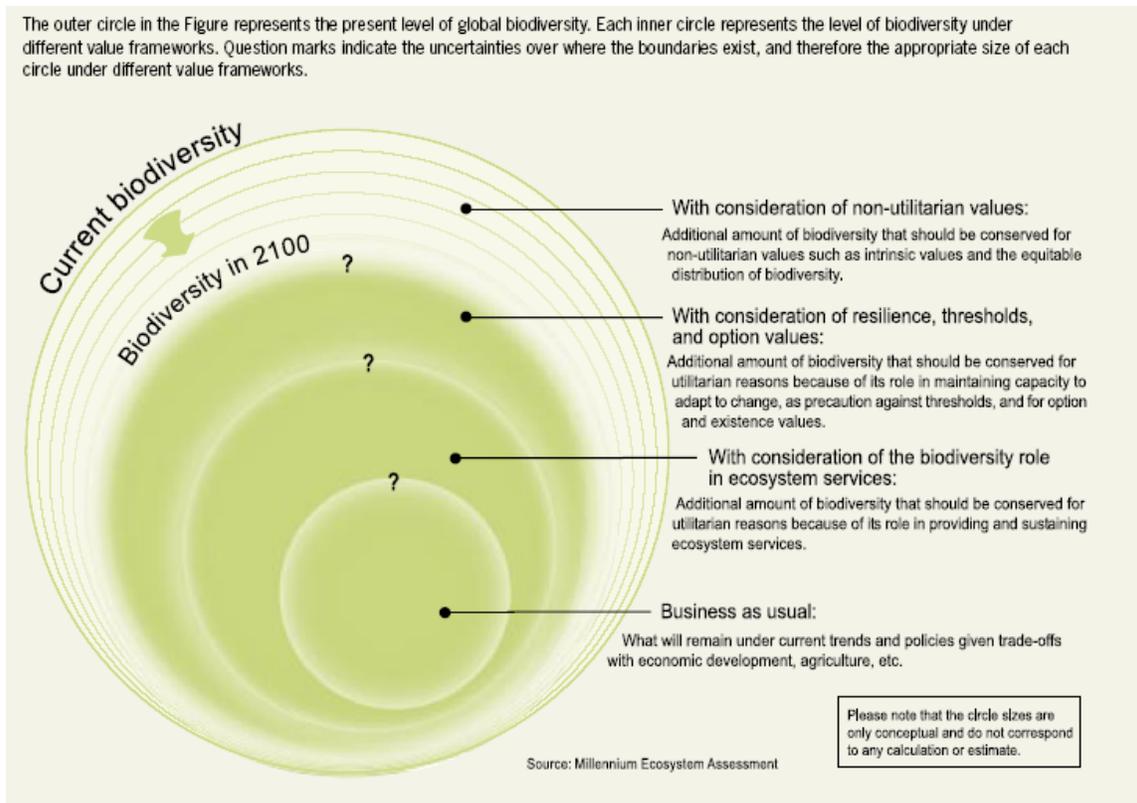
The Catskill example in New York State provides a good case study whereby a regulating service—water purification—was provided by negotiating with land owners to modify their land-use patterns in a manner that guaranteed the continued supply of that particular ecosystem service. The property right of land ownership provided that the ecosystem service was private, but the State was able to negotiate a settlement whereby a communal or collective right structure was created by bundling a number of private rights. The collective right was bought by individuals who valued the public good ecosystem service sufficiently to pay for the supply of this service. There are many other examples of where private rights have been collectively organized to produce a public good. However, this solution assumes that private right owners are willing to cooperate.

If one or more private property right owner decides to not cooperate, then the system may fail and the supply of the public good ecosystem service may not materialize. In these cases, there may be a need for a stronger role for the public sector. Increased knowledge of inter-linkages across ecosystem services—some exhibiting private property characteristics and others public good characteristics—may suggest that present institutions overseeing land use, land-use change, forests and water bodies may have to be redesigned in a manner that provides the public sector with the ability to intervene in private property regimes if necessary. No doubt these revisions have to be very carefully designed to protect individual rights of ownership while preventing abuse from the public sector.

#### **4. Valuation**

One of the main obstacles to creating markets for ecosystem services involves uncertainty over how to value them. Finding values for ecosystem services that are subject to clear property rights—like timber and food among others—is relatively easy. However, finding values for services that have public good characteristics and that cannot be subject to property rights is difficult. In the Catskill example above, the value of water purification service was computed by finding what the cost of a substitute would be if the ecosystem service was lost. In this case, it was the cost of building and maintaining a water filtration plant.

It must also be appreciated that values themselves can be divided into different categories. For example, Figure A shows that the amount of biodiversity conserved is determined by the types of values taken under consideration in decision-making frameworks. The actual frontiers, although unknown until we have more detailed information, tell us that the level of biodiversity to be conserved is highly dependent on the type of values—both economic and non-economic—that societies assign to biodiversity and ecosystem services.



*Figure A. How much biodiversity will remain a century from now under different value frameworks?*

Revealed preference (market-based) and stated preference (survey questionnaire) valuation methodologies have been considered as possible tools for valuing ecosystem services. Although both techniques have their merits, it should be acknowledged that these valuation techniques view the individual purely as a self-maximizing agent in a market environment. In reality, individuals are known to act as moral agents making judgments and assigning values from a social perspective, including their own well-being, the well-being of others and in some cases, a relative loss of personal well-being.

In addition, the philosophy of a majority of valuation methods treat an environmental good as a normal private commodity that can be purchased and consumed. However, many ecosystem services cannot be treated as private goods: they have the characteristics of public goods. As such, it is not only an individual's value of that service that counts, but the collective value that society places on that service that matters. This reflects the true value of the ecological "service."<sup>14</sup> Dasgupta asserts that preserving biodiversity is a political choice and although valuation methodologies can help in reaching political decisions, their role could be, at the most, peripheral.<sup>15</sup>

<sup>14</sup> Sen, Amartya. 1995. "Environmental Evaluation and Social Choice: Contingent Valuation and the Market Analogy," *The Japanese Economic Review*. United Kingdom: Blackwell Publishers. Vol. 46(1):23–37.

<sup>15</sup> Dasgupta, P. 2001. *Human well-being and the natural environment*. Oxford: Oxford University Press, p.136.

### *Equity and Fairness*

While markets may be effective in determining efficient allocation of scarce resources, it is also well-known that markets do not take into account issues relating to equity and fairness. In poor countries, the poor depend quite heavily on ecosystem services for their well-being and the transfer and use of these resources is usually done through non-market channels.<sup>16</sup> Therefore, bringing these ecosystem services into the formal market may cause some groups of individuals to be pushed into destitution. Moreover, by placing a price on a service which, previously, had been free and which people believe should be always be free, like clean water for personal consumption, clean air and flood regulation, may raise issues of ethics and rights. Many of the public good-type ecosystem services can be considered basic human rights about which prices and markets should not be discussed.

The Pareto Optimality Criterion used in neo-classical economics can be considered one principle for fairness. It states very broadly that an economic intervention should leave no one person worse off than they were before the intervention. This principle however, will allow a situation to arise whereby the gap between the haves and have-nots increases. If we are to prevent the equity gap between individuals or groups to increase, something more is needed.

A second principle addressing the division between social groups or individuals is therefore needed. One form of such a principle can be taken from the Equity Optimality Principle. Along the lines of Pareto Optimality, it states that the equity gap between individuals or groups after an economic intervention should be no larger than the gap before the intervention. In this way, if one individual has benefited from the economic instrument, then some transfer will need to take place to ensure that the gap between that individual and others will remain the same. In other words, some form of social redistribution mechanisms needs to be institutionalized at the same time the economic instrument is implemented.

### *Trading Platforms and Costs*

Markets for ecosystem services can occur at a variety of scales ranging from global trading platforms for carbon emissions to local watershed initiatives for water supply and purification. The exact type of platform will of course depend on the type of ecosystem service under consideration. Ecosystems which provide global benefits should ideally have markets developed at the international level. This however, will need to be developed keeping in mind World Trade Organization (WTO) rules and practices. Ecosystem services which are transboundary (like water) will need to have markets at the regional level. Again, these markets will have to abide by any trade rules governing the region. Ecosystem services within national boundaries will be in many cases the easiest to develop and operate. However, even in the case of local markets for ecosystem services, supporting institutions will need to be established if markets are to operate efficiently and market participants to have trust in market transactions.

Creating a market can be quite costly. Unless economies of scale can be recognized, transaction costs can sometimes outweigh the efficiency benefits markets produce. Parquin and Mayrand (2005)<sup>17</sup> identify three main types of cost that can occur when markets are established. The first

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<sup>16</sup> *ibid*, p. 198.

<sup>17</sup> Marc Paquin and Karel Mayrand. 2005. *MEA-based markets for ecosystem services*. Unisfera International Centre.

[http://www.unep.org/dec/docs/IIED\\_ecosystem.pdf](http://www.unep.org/dec/docs/IIED_ecosystem.pdf)

involves the cost of establishing a market. This involves economic valuation, establishing institutions and stakeholder consultation, among other initial costs. The second category of costs involved depends on the type of market created. If it involves forming a collective of private owners, then financial resources have to be mobilized to pay private right owners. These funds can either come from the parties benefiting from the ecosystem service or public funds and/or donors. In the case of the latter, it's necessary to ensure that the flow of funds is sustainable, otherwise the market may cease to exist once the initial flow of funds cease. The former is the most sustainable, as funds are generated by market demand for the ecosystem service; so as long as there is demand, there will be a flow of funds to pay for its continued supply.

## 5. Lessons Learned: Some Case Studies

While the most notable market to date is the Clean Development Mechanism (CDM) negotiated under the United Nations Framework Convention on Climate Change (UNFCCC), multi-million dollar markets in carbon, wetlands, biodiversity and water regulation have been developed. In a recent review, Pagiola and Platais (2003)<sup>18</sup> found more than 300 markets for ecosystem services in existence around the world. Both developed and developing countries have been establishing pilot and experimental markets for ecosystem services. The Katoomba Group provides a rich database of experiences and lessons learned from creating markets for ecosystem services across a range of countries.<sup>19</sup> The example shown in Box 1 depicts the experience of Costa Rica in establishing a market for various ecosystem services, including carbon sequestration, watershed protection, scenic beauty and biodiversity conservation.

### *Box 1: Payments for forest environmental services in Costa Rica*

The *Fondo Nacional de Financiamiento Forestal* (FONAFIFO) pays forest owners and protected areas in Costa Rica for reforestation, forest management and forest conservation under 10–15 year contracts. FONAFIFO acts as an intermediary between forest owners and buyers of various ecosystem services, including carbon sequestration, watershed protection, scenic beauty and biodiversity conservation. As of the end of 2001, almost 4,500 contracts had been written covering over 250,000 hectares, at a cost of US\$50 million, with pending applications for another 800,000 hectares. Funds for the scheme are derived from a national fuel tax, supplemented by contributions from private companies.

Sources: Pagiola *et al.* 2003. *op.cit.* Snider *et al.* 2003. *op.cit.* Miranda, M., Porras, I., T. and Moreno, M. 2003. "The social impacts of payments for environmental services in Costa Rica. A quantitative field survey and analysis of the Virilla Watershed." *Markets for Environmental Services*, No. 1. London: IIED.

Another example (shown in Box 2), which is gaining increasing prominence, is the creation of a carbon sequestration market to manage the global climate system.

<sup>18</sup> Pagiola, S and Platais. 2003. *Payments for ecosystem services*. Washington D.C.: World Bank.

<sup>19</sup> See Katoomba website at: <http://www.katoombagroup.org>

**Box 2: Trade in carbon sequestration services**

The prospect of the Kyoto Protocol coming into force has led to the emergence of diverse carbon sequestration projects in developing countries. Some large companies have bought land to establish plantations. For example, the vehicle manufacturer Peugeot bought land in Mato Grosso, Brazil, to establish native species plantations. Companies have also set up new organizations to promote the establishment of forest plantations. FACE Foundation, for example, is an organization backed by Dutch utilities that has initiated the Programme FACE de Forestacion PROFAFOR program in Ecuador under which private landowners and communities receive funding for establishing plantations in exchange for ceding the carbon rights to FACE.

Sources: May *et al.* 2004. *op.cit.* Albán M. and M Argüello. 2004. “Un análisis de los impactos sociales y económicos de los proyectos de fijación de carbono en el Ecuador. El caso de PROFAFOR-FACE.” *Markets for Environmental Services*. No. 7. London: IIED.

Carbon trading is emerging as the biggest and most structured market with the potential of reaching US\$40 billion by 2010, demonstrating that markets for other ecosystem services are possible. For example, the recent creation of a market for water regulation services in Panama initiated by international insurance and reinsurance companies suggests that there are potential markets—largely untapped—for other developing countries (see Box 3).

**Box 3: Market for the flood regulating ecosystem service**

Each ship that goes through the Panama Canal requires 200m litres of fresh water to operate the Miraflores lock. Over the years, the water has been drying up.

Scientists at the Smithsonian Tropical Research Institute in Panama, think that reforesting the Canal’s denuded watershed would help regulate the supply. A deforested, grass-covered watershed would release far more water in total than a forested one, scientists estimate. However, the water would arrive in useless surges rather than as a useful steady stream. A forested watershed makes a lot more sense.

Deforestation allows more sediment and nutrients to flow into the canal. Sediment clogs the channel directly. Nutrients do so indirectly, by stimulating the growth of waterweeds. Both phenomena require regular and expensive, dredging. More trees would remedy these problems, trapping sediments and nutrients as well as regulating the supply of fresh water. Planting forests around the Panama Canal would thus have the same effect as building vast reservoirs and filtration beds.

In the case of the Panama Canal, the answer may lie in recourse to a forestry insurance company based in London, *ForestRe*. John Forgách, entrepreneur, banker and chairman of *ForestRe*, proposes to use the financial markets to arrange for companies dependent on the Canal to pay for reforestation. Working in collaboration with several as-yet-unnamed insurance and reinsurance companies, Mr. Forgách is trying to put together a deal in which these companies would underwrite a 25-year bond that would pay for the forest to be replanted. The companies would then request their big clients who use the Canal to buy the bond. Firms such as *Wal-Mart* and a number of Asian carmakers, which currently insure against the huge losses they would suffer if the Canal were closed, would pay a reduced premium if they bought the forest bond.

Source: *The Economist*, April 21, 2005.

At the international level, several UN agencies and programs have undertaken studies and activities in the field of ecosystem services.

- The Biotrade Initiative has been developed under the aegis of the UN Conference on Trade and Development (UNCTAD) to stimulate trade and investment in biological resources to advance sustainable development in line with the objectives of the Convention on Biological Diversity (CBD). The Initiative has established partnerships with national and regional organizations to enhance the capacity of developing countries to produce value-added products and services derived from biodiversity while respecting environmental, social and economic sustainability. Such products are then sold in domestic and international markets.<sup>20</sup>
- A joint program between UNCTAD and the Earth Council Institute, the Carbon Market Programme, aims at exploring the economic, trade and investment impacts of climate change in developing and transitional countries and promoting the effective participation of these countries in the carbon market.<sup>21</sup>
- A component of the World Bank's activities on environment and natural resources management focuses on fostering the necessary skills for the application of market-based instruments, policies and options for conserving biodiversity. Skills are developed to design and create mechanisms to capture the total economic value of environmental services such as biodiversity, watershed protection, soil formation and erosion resistance.<sup>22</sup> With regard to the carbon market, the World Bank has developed several products for carbon finance, including the Prototype Carbon Fund, the Community Development Carbon Fund and the BioCarbon Fund, to catalyze private sector investment to address climate change.<sup>23</sup>
- The Inter-American Development Bank has undertaken work in the field of eco-tourism,<sup>24</sup> as well as to identify new avenues for investment in forest and biodiversity conservation and rational utilization.<sup>25</sup>

These examples demonstrate the viability of markets for ecosystem services. However, some initiatives have faced many obstacles. For example, in the case of the carbon market, some issues have proved controversial and difficult to integrate in carbon emissions trading schemes. This is the case for land use, land-use change and forestry (LULUCF). While the criticisms and/or caveats are many, solutions can be found and these barriers should not be used as reason for inaction.

### *Criteria for Markets for Ecosystem Services*

In the preceding overview section of MBIs for ecosystem services, one observation becomes clear. A host of factors play an integral part in the design and implementation of these instruments.

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<sup>20</sup> See <http://www.biotrade.org>

<sup>21</sup> See <http://www.unctad.org/ghg/index.html>

<sup>22</sup> See

<http://web.worldbank.org/WBSITE/EXTERNAL/WBI/WBIPROGRAMS/ENR/0,,contentMDK:20282018~pagePK:64156158~piPK:64152884~theSitePK:460957,00.html>

<sup>23</sup> See <http://carbonfinance.org/> and work by the International Finance Corporation at <http://www.ifc.org/ifcext/enviro.nsf/Content/CarbonFinance>

<sup>24</sup> See [http://www.iadb.org/sds/ENV/site\\_5812\\_e.htm](http://www.iadb.org/sds/ENV/site_5812_e.htm)

<sup>25</sup> See [http://www.iadb.org/sds/ENV/site\\_45\\_e.htm](http://www.iadb.org/sds/ENV/site_45_e.htm)

Therefore, on consolidating all the critical factors identified from the various instruments discussed earlier, we propose using the following eight criteria for implementing an environmental policy when MBIs are identified and designed.

- jurisdiction;
- environmental effectiveness;
- economic efficiency (cost effectiveness);
- demand and supply distributional effects;
- harmonization with other instruments;
- incentives;
- competitiveness; and
- institutional efficiency (transaction cost effectiveness).

*Jurisdiction.* Each level of government has jurisdiction over certain facets of the economy and the environment. It would be futile to try to address an environmental problem at the provincial level when the federal government has full jurisdiction. Therefore, the first step is to ascertain the degree of jurisdictional control that is available before choosing a particular instrument and to make sure that the instrument chosen does not have cross-jurisdictional impacts.

*Environmental effectiveness.* In many ways this factor may be a more appropriate *post-ante* evaluation factor rather than an *ex-ante* factor for choice and design. However, as we shall demonstrate below, some instruments are better suited to address certain environmental problems than others.

*Economic efficiency.* This criterion evaluates if the instrument is able to achieve the environmental objectives in the least-cost manner. We restrict the cost category here to purely economic costs (production costs).

*Demand and supply distributional effects.* Some environmental instruments can cause distributional effects across user groups. For example, a tax on gas can have significant income effects on lower income groups, such as unemployment issues relating to higher production costs and lost competitiveness.

*Harmonization with other instruments.* In many instances, MBIs do not work in isolation. Care must be taken to ensure that the instrument does not conflict with other existing instruments whether they are regulatory, economic or market-based. Attention should also be paid to ensure that supporting instruments are designed—if necessary—to support the main instrument.

*Incentives.* Some instruments may provide the incentive for polluters to adopt additional measures to reduce their polluting activities. For example, effluent taxes have the distinct advantage of providing incentives for firms to find new technologies to reduce their effluent tax bill versus simple command-and-control systems.

*Competitiveness.* When an environmental policy is being formulated, production costs may go up. If this happens, then attention must be paid to the loss of competitiveness by industries within the jurisdiction (versus similar firms outside the jurisdiction).

*Institutional efficiency.* All instruments have some form of transaction costs,<sup>26</sup> some more than others. This is an element that gets ignored in a majority of economic analyses but is a component that can become significantly large in respect to the economic and social costs.

## **6 Pro-Poor Markets for Ecosystem Services**

Most MES are not created with the objective of alleviating poverty. The primary aim has been to generate funds for conservation objectives. But it is increasingly recognized that many of these markets are bound to affect the poor in a number of ways. Findings from the MA indicate that MBIs can play a considerable role in poverty reduction.

Local people may be excluded from or have to purchase ecosystem services which they were used to accessing for free in the past, which contributes to their impoverishment. For example, in 1991 the Government of Uganda established a national park in the Bwindi forest to protect the mountain gorilla and biodiversity. This park was established with little consultation with the local populations, who had traditionally collected various forest resources from the area to enrich their livelihoods. Furthermore, they were excluded from entering the park to undertake their customary harvesting activities. This measure was particularly onerous for local communities as the park forest acted as a food buffer and grazing area for them when crops failed. As a result, poaching of species living in the park and encroachment into the park were rampant. In response in 1995, the Mgahinga and Bwindi Impenetrable Forest Conservation Trust Fund was created to improve park governance by including local communities and governments in its management. Proceeds from the park are now shared with the local communities to encourage sustainable development activities and conservation. The success of this market-based initiative clearly points to the value of community involvement and benefit sharing.

The poor may also have the opportunity to generate income from an asset, which they may have provided free of charge to other users of the service in the past. Such a pathway can only materialize if the poor actually own the service or have some legitimate claim to the service in question. Lack of information, knowledge and financial capital can also prevent the poor from playing an active role on the market (see Box 4).

### ***Box 4: Pro-poor market for carbon sequestration***

The World Bank initiated three funds to invest in projects aimed to reduce industrialized greenhouse gas emissions while promoting sustainable development and public and private partnerships. On the basis of joint implementation under the Clean Development Mechanism (CDM) of the UN Framework Convention on Climate Change, the World Bank established the Prototype Carbon Fund (PCF), the Community Development Carbon Fund (CDCF) and the Bio

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<sup>26</sup> Transaction costs in this paper relate to the costs of operating and maintaining the system required for the successful implementation of the instrument

Carbon Fund (BCF). All three benefit from a unique interface of carbon asset creation, private project finance and intergovernmental market regulation.<sup>27</sup> The Prototype Carbon Fund (PCF) began operating in April 2000 and, by June 2002, had contributions of US\$180 million from six investing countries and 17 companies. As of October 2003, the Fund had allocated US\$90 million, primarily to renewable energy and energy efficiency projects. Two years after the creation of the PCF, the World Bank launched the Community Development Carbon Fund (CDCF) and the Bio Carbon Fund (BCF). Because high transaction costs involved with the Kyoto Protocol have led to significant bias towards large-scale projects, poorer rural communities have been left out of the carbon market. The CDCF seeks to work with local intermediaries to lower transaction costs and enhance the lives of the poor through carbon financing. With a target size of US\$100 million, the CDCF will finance small-scale projects with specific community development benefits.

*Pushpam Kumar. 2005. Market for ecosystem services. Winnipeg, IISD.*

Markets for ecosystem services may also create employment opportunities for the poor. For example, the creation of eco-tourism has opened up such opportunities for local communities, though there has been criticism that most of the employment is given to outsiders. If employment is provided for local people, it is usually of a low-skill nature with detrimental social consequences for local communities (MA, Responses, 2005).<sup>28</sup> There is therefore a real need to make sure employment opportunities that emerge from ecosystem services benefit from local involvement.

## **7 Pro-Poor Markets for Ecosystem Services: A Tool for the MEAs**

The links recently brought to the fore by the MA between the objectives of various MEAs and the MDGs makes it even more important for MEAs to explore new and innovative mechanisms to contribute to achieving the MDGs, as well as to fully achieve their own objectives. Furthermore, the MA highlighted the scope for various MEAs to combine their resources and efforts in creating MES, a potential mechanism to address poverty based on the close inter-dependency between a number of ecosystem services which fall under the mandate of different MEAs.

Synergies in the work of various MEAs, both at the substantive and institutional levels, have been highlighted by several studies and reports, including those from various MEA Secretariats themselves. For example, the Joint Liaison Group was established to improve the exchange of information between the Rio Conventions to explore opportunities for synergistic activities and to increase coordination between the three conventions and their secretariats for the benefit of their respective parties. Among other activities, the Group has discussed the organization of a joint workshop to further explore opportunities for synergies among the three conventions. A first reflection on possible cross-cutting areas identified forests and forest ecosystems; conventions would benefit from exchanges and findings on these topics. Similarly, the advancement of synergies has been promoted through developments within the financial mechanisms available for

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<sup>27</sup> In fact, between 1988 and mid-1995, the World Bank committed US\$1.25 billion in loans, credits, and grants for projects with the explicit objective of conserving biodiversity. The money leveraged an additional US\$0.5 billion (Jana and Cooke 1996).

<sup>28</sup> Millennium Ecosystem Assessment. *Responses Working Group ecosystems and human well-being: Policy responses*. Volume 3: Findings of the Responses Working Group of the Millennium Ecosystem Assessment. Washington, DC: Island Press, 2005, xxi, p. 621.

MEAs. For example, after the designation of the Global Environment Facility (GEF) as the financial mechanism of the UN Convention to Combat Desertification (UNCCD) in May 2001, the GEF Council decided to pursue the designation of land degradation as a focal area, which, in 2003, led to the allocation of more than US\$18 million by the GEF to new projects under the category of land degradation. Under this development, the UNCCD has adopted a decision on “collaboration with the GEF,” and, at its sixth Conference of the Parties (COP) highlighted the issue of synergies with other conventions and developed a joint approach with the United Nations Forum on Forests (UNFF), the UNFCCC and the Convention on Biological Diversity (CBD).

Although synergies among MEAs have been discussed at the government level, little work has been undertaken to clarify potential synergies with private investment and the role of the business sector.<sup>29</sup> The development of pro-poor MES could provide an opportunity to clarify these roles. Moreover, there are a variety of instruments that fall under the broad umbrella of MES.<sup>30</sup>

Markets have been established for four categories of ecosystem services: carbon sequestration, water quantity and quality, biodiversity protection and landscape beauty. Out of these categories, carbon and biodiversity fall within the scope of the UNFCCC and the CBD. Markets for ecosystem services on water quantity and quality could be addressed under the Ramsar Convention on Wetlands; markets for bundled services could fall within the purview of other conventions, including the Convention on Migratory Species of Wild Animals (CMS); and certain markets that affect agricultural practices could fall under the scope of the UNCCD.

Markets for ecosystem services, more specifically pro-poor markets for ecosystem services, require institutions that can monitor ecosystem health, resolve conflict, coordinate individual behavior and allocate and enforce rights and responsibilities. In the context of developing countries, many of these requirements are unlikely to be met. Many poor countries suffer from inadequate institutional capacity to make contractual agreements. In order to remedy this barrier, payment mechanisms can be carefully designed to protect entire ecosystems or specific species, with diverse institutional arrangements existing among governments, firms, multilateral donors, communities and individuals.<sup>31</sup> The MEAs can play a vital role in this existing institutional framework as illustrated in the United Nations Environment Programme’s (UNEP) 2004 report, *Economic Instruments in Biodiversity Related Multilateral Environmental Agreements*,<sup>32</sup> which highlights the important role of market-based instruments towards the objectives of the MEAs.

The potential of using MEAs as institutional mechanisms to spearhead the creation of markets for ecosystem services was highlighted at the recent OECD Workshop on Multilateral Environmental Agreements and Private Investment. Conversely, the importance of economic instruments and other incentives to help implement MEAs is stated in several agreements and the decisions of their

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29 ...synergy exploration efforts have not yet explicitly focused on the role of the business sector in the implementation process of MEAs, or on ways to improve attraction and allocation of private investments by cooperative approaches, OECD, Working Party on Global and Structural Policies (2005). “Multilateral Environmental Agreements and Private Investment. Business Contribution to Addressing Global Environmental Problems.” p. 61. April 19. ENV/EPOC/GSP(2004)4/Final. <http://www.oecd.org/dataoecd/46/45/34860486.pdf>.

30 See the Millennium Ecosystem Assessment Response Working Group report for a detailed analysis of the various market based instruments in practice.

31 Ferraro, P J and A. Kiss. 2003. Response to Swart (Will Direct Payments Help Biodiversity?), Science, Vol. 299, March 28.

32 United Nations Environment Programme. *Economic instruments in biodiversity-related multilateral environmental agreements*. Nairobi: United Nations Environment Programme, 2004, p. 114.

governing bodies. In addition to mechanisms developed under the UNFCCC, biodiversity-related conventions also recognize the potential of economic instruments, and all have recognized the importance of valuing environmental resources and services.<sup>33</sup>

For example, the CBD requires Parties to “adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity” (Article 11). The CBD’s Conference of the Parties (COP) has addressed economic incentives in several Decisions,<sup>34</sup> and has offered recommendations on the design and implementation of incentive measures (Decision VI/15).

The COP of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) has emphasized that “for trade to be responsible and based on sustainable use, social and economic incentives are needed,” and further stresses the need “to assist in the development of appropriate domestic legislation and policies that encourage the adoption and implementation of social and economic incentives allied to legal instruments that promote and regulate... responsible trade in wild fauna and flora” (Strategic Vision Through 2005). The COP has also called for a “review of ... national policy regarding the use of and trade in CITES-listed species, taking into account economic incentives” (Decision 12.22).

The Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat has established the goal of promoting “incentive measures that encourage the application of the wise use principle, and the removal of perverse incentives” (Strategic Plan 2003–2008, Objective 8). To achieve this goal, a number of actions are set out, including investigating linkages between incentives and related topics, such as financial mechanisms, trade, impact assessment and valuation. Additionally, Resolution VIII.23 on Incentive Measures as Tools for Achieving the Wise Use of Wetlands, which builds on previous resolutions,<sup>35</sup> urges Contracting Parties to develop supportive legal and policy frameworks for the design and implementation of incentive measures.

No MES will be successful unless proactive efforts are made to recognize rights and shape markets to provide equal access to low-income producers of ecosystem services. For example, the MA found that Transferable Development Rights (TDRs)—a market-based instrument—were successful in conserving biodiversity when they were developed through a participatory process involving local communities and when the benefits were distributed in an equitable manner.

In this respect, MES offer MEAs a valuable mechanism to achieve the sustainable use of ecosystems and sustainable development. For example, Article 11 of the CBD requires its Parties to adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity. In a similar fashion, the COP of the Ramsar Convention, in Resolution VIII: 23, urges Parties to develop supportive legal and policy frameworks for the design and implementation of incentive measures.

The MA found that the success of MEAs in achieving their specific goals depend on four inter-related conditions: (1) the design of the agreement; (2) the way the agreement has been negotiated; (3) policy coherence at the international level; and (4) the domestic context in which the agreement is to be implemented. This paper focuses on the domestic context and the role that MES can play

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<sup>33</sup> CBD COP Decision VI/15; CITES COP Decision 12.22; Ramsar COP Resolution VII.15.

<sup>34</sup> Decision III/18, IV/10, V/15, V/14, VI/15, and VII/18.

<sup>35</sup> Resolution V.6, VII.15.

in strengthening the implementation of MEAs. MEAs are still struggling in the face of development priorities. It is still a widely spread misconception that environment protection infringes on a country's right and capacity to develop. The successful implementation of MEAs lies in designing instruments that contribute towards development goals and are not perceived as antagonistic to development, and more particularly, to poverty alleviation.

In addition, the development of MES provides an innovative financing mechanism for the sustainable management of ecosystem services. Rather than just stressing the need for financing for conservation, the focus should also include financing for the sustainable use of ecosystem services. The unique feature of MES is that the goals that they strive to achieve complement the goals and objectives of many of the MEAs. One of the main barriers faced by MEA secretariats in pursuing their goals has been the lack of financial resources. Markets for ecosystem services provide a mechanism which overcomes this barrier. Moreover, over the last five years, the goal of poverty alleviation has increasingly become one of the central goals of many of the MEAs. Again, markets for ecosystem services, if designed in a pro-poor manner, offer a mechanism, which can contribute to poverty alleviation.

Although there has been an increase in the number of MES developed over the last two decades, most of them have been developed outside the framework of MEAs, with the exception of the CDM under the UNFCCC. The MA shows a high degree of complementarities between a range of ecosystem services and services under the auspices of the different environmental conventions. There is therefore an argument for MEAs to adopt a coordinated approach to the creation of MES at the country level. For example, a bundled market for ecosystem services of water regulation, biodiversity conservation and carbon sequestration could be developed jointly under the Ramsar Convention, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the CBD and the UNFCCC, among others. The pooling of resources by these various MEAs can greatly reduce the costs of information gathering, institutional frameworks and the maintenance of the market, while at the same time lowering the burden on developing countries.

There are presently four main ecosystem services for which markets have been created. These include carbon sequestration, biodiversity conservation, water and eco-tourism. The MA highlights a high degree of synergy and interdependency across many ecosystem services (MA 2003,<sup>36</sup> 2005<sup>37</sup>). For example, the Mgahinga and Bwindi Impenetrable Forest Conservation Trust in Uganda contributed to the simultaneous implementation of the CBD, the Ramsar Convention and the UNFCCC. There is therefore a potential for bundling services and creating a single market that would have multiple benefits. By bundling services, MEAs can pool their limited resources as well as reduce the cost of creating markets.

The MEAs are sector driven. For example, the CBD's primary objective is the conservation of biodiversity while the UNFCCC focuses on climate change. On the basis of the great potential for synergies, there are many opportunities for MEA secretariats to pool their resources and use their collective knowledge to further their individual mandates. The high degree of inter-dependency among ecosystem services further reinforces this opportunity.

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36 Millennium Ecosystem Assessment. 2003. *Ecosystems and human well-being*. Washington D.C.: Island Press, Washington D.C.

37 Millennium Ecosystem Assessment. 2005. *Ecosystems and human well-being: The biodiversity synthesis report*. World Resources Institute, Washington D.C.

Another positive factor in favor of pursuing markets for ecosystem services through various MEAs is the legally binding nature of the MEAs. The objectives and programs of work/work plans of various MEAs are the result of a consensus between their respective contracting Parties. The legally binding nature of MEAs would strengthen initiatives on markets for ecosystem services. Policy makers in member countries are more likely to provide their official support to initiatives undertaken towards the implementation of a legally binding instrument and related decisions.

The MA has identified ten major ecosystem types and eleven major ecosystem services. These ecosystem services are examples of services for which MEAs can work together to identify collective solutions for the sustainable use of these services through the creation of markets.

The following benefits of going through MEA processes should also be mentioned:

*1) MEAs provide a multilateral framework where related issues are tested and discussed:*

As in the case of the CDM, by using the Kyoto Protocol framework, complex issues such as domestic forces, relationships with the private sector and the scope and legal nature of market-based mechanisms, have been weighed and, to some extent, addressed.

*2) Financing:*

There are several phases where financing would be necessary for setting up MES including the development of the market, the actual transactions and ensuring the sustainability of the market. By going through an MEA framework, key sources of financing may be identified and used, such as the GEF, private investments, etc.

*3) MEAs provide trading platforms for markets for ecosystem services:*

MEAs provide a tested mechanism for setting up trading platforms. For example, Paquin and Mayrand<sup>38</sup> describe two possible trading platforms for markets for ecosystem services under the scope of the Rio Conventions. The first one would be the creation of a type II fund that would collect funding from businesses, foundations, non-government organizations (NGOs), inter-governmental organizations (IGOs) and other public entities for the provision of ecosystem goods and services. In practice, funders would buy a quantity of specific services (carbon, biodiversity or land-related) or bundled services that would be specified in the transaction. The fund would then use this funding to finance projects for the provision of those ecosystem services. Alternatively, it could allocate the funds through national focal points. Projects could be submitted by countries, NGOs or implementing agencies and would have to meet a series of specific requirements that would be jointly established by the Secretariats of the Rio Conventions. The governing structure of the fund could comprise representatives of the Rio Conventions, the GEF, IGOs, NGOs and/or private sector representatives.

A second potential trading platform is a clearing-house mechanism based on the model of the ecosystem marketplace<sup>39</sup> where demand and supply for ecosystem services can meet. The clearing house would provide accurate and reliable information on projects for the provision of ecosystem services that private companies, foundations, IGOs and NGOs could finance. Such an information-sharing platform would significantly reduce transaction costs for buyers and sellers of ecosystem

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<sup>38</sup> Marc Paquin and Karel Mayrand, MEA-based Markets for Ecosystem Services, Draft concept paper prepared for the OECD Workshop on Multilateral Environmental Agreements (MEAs) and Private Investment, Helsinki, Finland, June 16–17, 2005.

<sup>39</sup> Ecosystem marketplaces are institutions created by organizations with a vested interest that bring buyers needing environmental credits together with sellers of ecosystem services.

services by providing a single portal where biodiversity, carbon and land-related services can be traded. This would considerably reduce the costs associated with information gathering and searching for funders or service providers. Also, the clearing house would provide other services, further reducing transaction costs and improving transaction efficiency.

There is therefore no doubt that the MEAs consider it important to use economic instruments and markets for achieving their respective objectives. The challenge for the MEA community is three-fold. First, links need to be made between sustainable use of ecosystem services and poverty reduction, in particular the MDGs. Secondly, on-the-ground prototype markets for ecosystem services need to be carried out. Finally, markets should be pro-poor and therefore ensure that the benefits of these new markets work to reduce poverty.

## **8 Challenges and Opportunities**

*Coordination.* There is a potential role for UNEP to play in bringing together MEAs to work towards the sustainable use of a range of inter-dependent ecosystem services. Several governing bodies of MEAs have adopted decisions, resolutions and recommendations requiring the Secretariats of these MEAs to cooperate with and/or establish partnerships with other relevant MEAs in achieving their objectives. The CBD, for example, adopted Decision V/15, which calls for collaboration with the Ramsar Convention. While forming bi-lateral partnerships is a step in the right direction, there is a potential for developing multilateral partnerships involving more than two MEAs. UNEP can play a critical role in bringing together and promoting these partnerships, as well as providing appropriate expertise. In this endeavor, UNEP can also bridge the gap with the development community through its global partnership with the UN Development Programme (UNDP) and its close links with the UN Millennium Project.

*Bundling.* It should be born in mind that the process of creating a market for a bundle of ecosystem services encompassing a range of MEAs and relevant development partners may be a difficult task. Moving the issue forward will require moving beyond the production of reports on economic instruments and best practices, and aim to pool existing resources under the MEAs and begin on-the-ground pilot exercises to explore the potentials and possible negative effects of prototype markets.

*Implementation.* Table 1 below summarizes the steps, approaches and issues that may need to be addressed when creating pro-poor markets for ecosystem services.

**Table 1.** Steps for creating pro-poor markets for ecosystem services using an MEA framework (Adapted from Stefano, 2004; and Paquin and Mayrand, 2005)

<b>Steps</b>	<b>Why do we do it?</b>	<b>How do we do it?</b>
Identify bundle of ecosystem services and related MEAs	<ul style="list-style-type: none"> <li>to assess the feasibility of the creation of a bundled market;</li> <li>to pool the collective knowledge of various MEAs with respect to various ecosystem services;</li> <li>to assess the added value of such a bundled market compared to other existing markets for ecosystem service mechanisms.</li> </ul>	Using the MA framework, identify inter-dependencies among ecosystem services, their linkages to MEAs and the dynamic processes underlying links between the services.
Determine the total socio-economic value of the current flow of benefits from an ecosystem.	<ul style="list-style-type: none"> <li>to understand the contribution that ecosystems make to society.</li> </ul>	Identify all mutually compatible services provided; measure the quantity of each service provided; and multiply by the value of each service. Develop a common valuation matrix for the bundled services. Identify ecosystems for which the objectives of the MEAs converge
Determine the net socio-economic benefits of an intervention that alters ecosystem conditions	<ul style="list-style-type: none"> <li>to assess whether the intervention is both socially and economically worthwhile.</li> </ul>	Measure how the quantity of each service would change as a result of the intervention, as compared to their quantity without the intervention; and multiply by the marginal value of each service.
Examine how the costs and benefits of an ecosystem (or an intervention) are distributed	<ul style="list-style-type: none"> <li>to identify winners and losers, for ethical and practical reasons.</li> </ul>	Identify relevant stakeholder groups; determine which specific services they use and the value of those services to those groups (or changes in values resulting from an intervention).
Identify potential financing sources for conservation and sustainable use of ecosystem services	<ul style="list-style-type: none"> <li>to help make ecosystem conservation and use self-sustaining financially.</li> </ul>	Identify groups that receive large benefit flows, from which funds could be extracted using various mechanisms.
Identify or design institutional mechanisms (both existing mechanisms from MEA frameworks and new mechanisms) to ensure equitable outcomes from market for ecosystem services initiatives	<ul style="list-style-type: none"> <li>to make sure that equitable outcomes emerge from a market for ecosystem services initiative and contribute to MDG-based poverty reduction strategies</li> </ul>	Identify target groups in need of support and undertake a deliberative participatory process to identify appropriate institutional mechanisms to ensure that MDG targets are achieved; assess the pros and cons of potential trading platforms and relationship with the CDM and the Ecosystem Marketplace; adopt governing structures and conduct pilot transactions.