The Use of Market Incentives to Preserve Biodiversity

Final Report

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Background and Objective

Market based instruments (MBIs) are increasingly discussed in the political debate over future strategies for biodiversity conservation. The reasons for this are twofold. Firstly, MBIs offer policy-makers new ways to reach conservation objectives more cheaply, as MBIs use market forces to pass on incentives. Secondly, MBIs can complement traditional regulatory measures, for example, by generating revenue to fund public conservation management.

The objective of this scoping study was to research how MBIs are currently used for biodiversity conservation and to assess the success or failure of these instruments and their potential for further use. The specific aims were to examine:

- which MBIs are in use;
- in which conservation areas are they applied most often and where are they especially useful;
- what challenges are associated with the use of MBIs in the field of biodiversity conservation.

It does this by reviewing the current literature and databases as well by using expert judgements about MBIs in use in the Member States of the EU and other countries with particular emphasis on successful and promising examples.

The study has been conducted for the European Commission (DG Environment) by Ecologic (Germany) in cooperation with the following institutes: IEEP (UK), GHK (UK), IVM (NL) and CEI (Czech Republic).

Results

During the course of this study, 204 examples of market based instruments for the preservation of biodiversity were analysed.

For the purpose of the report, we distinguished between the following types of market based instruments:

(A) Taxes, fees and charges;

(B) Subsidies/support;

(C) Tradable permits;

(D) Eco-labelling,

(E) Financial mechanisms (e.g. green venture capital funds) as well as

(F) Liability and Compensation schemes.

The analysis shows that price-based MBIs are more common than quantity based ones. The most frequently applied instruments belong to group A (taxes, fees and charges) followed by subsidies/support and tradable permits. In the majority of cases, MBIs are applied in the field of habitat and ecosystem conservation. Only one third of the examples are concerned with direct species conservation with a clear tendency toward preserving particular species of fauna rather than flora.

Overall, the majority of EU countries appear to have some MBIs of relevance to biodiversity conservation in place. Practice varies across the EU though: subsidies/support (slightly more than taxes) are the most commonly used instrument in Northern and Western Europe (e.g. UK and Belgium). The Netherlands stands out as having implemented a wider range of different instruments than other countries. In Central and Eastern Europe, taxes and charges appear to be more common though this varies between countries (e.g. taxes are widely used in Poland but subsidies/support are more common in the Czech Republic). Southern Europe appears to make less use of market based instruments.

Where particular types of flora were targeted, charges for tree protection are the most common instrument applied. Taxes and charges are also the preferred instrument used to preserve fauna. In addition, tradable permits are used for fauna conservation (mainly fishing permits and a few examples of tradable hunting permits exist). In the field of habitat and ecosystem conservation, there are many examples of entrance fees or charges and taxes for the use of natural resources.

Tradable permits in respect to habitat areas are only in use in the USA. In Australia their use is only in an initial stage, demonstrated by the existence of several pilot studies.

The use of financial mechanisms (such as green investing) to preserve biodiversity is still a rather specialised sector with only a few examples.

Lessons learned

In general, it is difficult to formulate clear recommendations about when and where the use of MBIs is appropriate instead of, or complementary to, Command and Control (CAC) approaches. The main reason for this is that biodiversity is such a heterogeneous good, and policies therefore need to be very much tailored to local needs. The paucity of ex-post evaluations is also problematic, as it is difficult to tell where MBIs are currently successful and in which cases a particular MBI is more effective compared to another MBI or CAC approaches.

Even so, there are a number of examples of MBIs that work well and produce results in achieving the desired biodiversity conservation objectives. It can therefore be suggested that they are put to wider use, particularly if they are used in conjunction with traditional regulation.

Our analysis indicates that the following criteria are of particular relevance to the successful design of MBIs:

- definition of **clear objectives** is crucial
- proper **definition of the good** to be traded, if tradable permits are being considered
- the **social effects** and the local/regional context need to be considered
- **unexpected environmental effects** i.e. negative effects in other areas need to be guarded against

- before the introduction of a totally new instrument or scheme, **pilot studies** should be carried out to see how stakeholders react and whether it is worth introducing the MBI on a wider scale.

- the **time-scale** of schemes needs to be managed it is short enough to be attractive to participants but long enough to have the desired effects on biodiversity.

- a balance needs to be reached between the concrete aims of the scheme and **flexibility** for participants

- the way different incentives **combine** together needs to be checked

- **prompt monitoring** should be put in place to assess the effectiveness of the measures and to adjust the level of charges or fees needed to secure behavioural changes

- **credibility** must be maintained by the administrating body for an incentive to be successful.

- an **evaluation** of schemes after implementation should be carried out as well as more continuous monitoring

- adequate **information** must be collected previous to a schemes introduction about who and what will be most effected by it

The design of an MBI is crucial for its success. The findings indicate that measures need to be closely tailored to fit local needs. For example, this could mean that measures need to be spatially differentiated even though this may lead to higher transaction costs. MBIs can also be designed to generate revenues, for example, through charges or fees or by using auctions in the case of trading schemes.

Public acceptance can also be obtained, especially where the MBIs complement and support regulation and, for example, where there is a clear long-term commitment.

Most of the promising approaches which are currently in use and could be more widely applied, seem to be those that are output based (e.g. results-oriented remuneration rather than measure related ones) because they leave actors more choice about how they reach a certain goal (innovation potential) while being effective. Obviously, the high complexity, variability and time scale of ecological systems makes it difficult to apply result-oriented remuneration only, but it is an option where the objective of the incentive is the protection of a particular component of biodiversity (e.g. species) or a particular ecosystem function.

Conclusion

Overall well-designed and credibly implemented MBIs seem to be able to deliver biodiversity objectives cost-efficiently (Chapter 5). Many of the examples currently in use have proved successful, if only at the local level, suggesting that there is scope for MBIs to be used more widely to preserve biodiversity.

In general MBIs of category A (taxes, fees and charges) can be seen as approaches that are useful to limit damage to existing biodiversity while MBIs of category B (subsidies/support) and D (eco-labelling) foster the provision of increased protection to biodiversity or the enhancement of its quality. In some of these cases, MBIs act as a way of conserving the quality of biodiversity whilst generating income, with the acceptance of stakeholders, which can then be used to fund biodiversity management needs.

From the examples identified, there is no single type of MBI that should always be used in preference to others, but rather many different types that can work better or worse depending on the particular circumstances and the specific context. When properly designed and used in a suitable context, MBIs can be more cost-efficient than traditional CAC approaches, due to the greater amount of flexibility allowed to the actors. Nevertheless, the implementation of MBIs and the creation of a working market remains a challenge, not least for the administration bodies responsible, and they are often applied on a fairly small or local scale.

Many examples of MBIs show that they work best not as a substitute to regulatory approaches, but complementary to them. Given that this is the case, it is worth considering the various options and using some combination of MBIs and regulatory approaches to achieve the desired aims.

1 Introduction

1.1 Background

Market failure for goods and services provided by biodiversity is one of the main reasons behind their unsustainable use and the high losses of biodiversity currently being experienced. The traditional response to market failures for public goods has been to provide the good through the public sector and place limits on the amounts used. Over the last few decades within the European Community, the predominant tool to achieve this objective has been the use of regulations derived from environmental law[1] (known as command and control, CAC methods). This approach has been responsible for much of the improvement of the environment of the European Community as well as for the better conservation of biodiversity.

Due to increasingly restricted financial resources, the monetary efficiency of policy measures and strategies is discussed alongside their environmental effectiveness[2]. Since most regulatory mechanisms are costly to the public and private sector, market based approaches are receiving an increasing amount of attention as a possibly cheaper alternative to these regulatory approaches.

Incorporating marginal costs and using market forces, can make MBIs more cost effective than traditional CAC. This means that either more ambitious conservation goals can be reached using a given budget or substantial cost savings can be achieved. In the field of environmental protection, where MBIs are more common and have a longer tradition than they do for biodiversity protection, these effects can already be observed. In a study carried out for the EPA, Anderson (1999) estimated that the potential savings could sum up to almost one-fourth of the expenditure on environment pollution control in the United States. A further example of this is the Emissions Trading Scheme, which will cut the cost of meeting Kyoto targets for the Member States. The potential cost savings of a global emission trading, compared to a protocol without trade, have been estimated to be significant: 84% at the world level and 56% for the EU (Gusbin et al. 1999). Besides the theoretical considerations, experience in the US with using market based instruments over the past decade has shown that cost savings exist in practice (EPA 2001)[3].

The restricted use of MBIs for biodiversity conservation might be due to the fact that (i) biodiversity loss has a number of drivers and strategies to tackle it are therefore more complex and multi-faceted than pollution or greenhouse gas emission reduction for example. (ii) conservationists may have ethical problems with the use of MBIs and giving living creatures a market price. Hence, it is not surprising that the most used MBI in the field of

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[1] In the case of biodiversity this has been done through restrictions and planning. (More than 10% of the earth's surface is categorised as protected (OECD 2004:62).

[2] Effectiveness refers to the accuracy and completeness to achieve specified goals. Efficiency is determined by relating the resources expended to the accuracy and completeness of goals achieved.

[3] For example, Carlson et al. (2000) estimate that the policy of the US Environmental Protection Agency to reduce SO_2 emissions by using allowance trading may save $700–800 million per year compared to a command and control programme based on a uniform emission standard.

biodiversity conservation has its roots not in environmental ministries but in ministries of agriculture[4].

1.2 Scope of the report

This report answers the question: How the current use of market based instruments as a management tool for biodiversity conservation can be increased? The paper concentrates on uses within the EU, nevertheless findings from non-member states are also incorporated. The focus of the report is on MBIs that are specifically designed for the conservation and sustainable use of biodiversity.

The report answers the following questions:

- Which MBIs have already been implemented and which are most used?
- Are there some types of MBI which are less used, on average, in the European Union than other OECD countries and are there more possibilities for their use in the EU?
- Are MBIs applied to a greater extent in some conservation areas (field of applications) than in others?
- What information is available on the performance and effectiveness of specific MBIs? In what situations have they worked / failed and why? Can this information be used to help with the implementation of new schemes?
- What are the lessons learned from successful examples and how could this experience be used for the implementation of new MBIs?

The report will attempt to distil the key factors from the various case studies identified across the EU and OECD and work out what leads to the project's success or failure. This is based on literature studies, expert interviews and input from the participating partners. The way the different types of instrument have been used in is described using particular examples in chapter 6. Promising approaches which have proved to be successful in one location and which have the potential for broader application within the EU are described in chapter 7. The appendixes provide detailed information in the form of brief fact sheets on particular approaches, longer case studies and an excel database of literature sources.

[4] ...and the main aim of agricultural subsidies was not nature conservation but income maintenance for farmers

2 Market Based Instruments

The EEA[5] defines Market based instruments (MBIs) in the following way: *"Market-based instruments seek to address the market failure of 'environmental externalities' either by incorporating the external cost of production or consumption activities through taxes or charges on processes or products, or by creating property rights and facilitating the establishment of a proxy market for the use of environmental services."* Market failure, in the case of biodiversity, originates from the nature of the goods and services provided by biodiversity. The main problems are: (i) biodiversity related goods and services are often public goods, (ii) the use or conservation of biodiversity is associated with external effects, and (iii) an asymmetry of information between those paying for conservation measures and those carrying them out sometimes exists.

MBIs are receiving increasing attention as a method of environmental management. They have the following advantages over CAC:

1. They allow a flexible response to price signals and encourage innovation.

2. They are cost effective and encourage improvements to be achieved in the cheapest manner.

3. They should avoid some of the negative incentives (e.g. the presence of a protected species on land being regarded as a liability) which may be occasioned by regulatory approaches.

4. In most cases they attempt to follow the polluter pays principle so that the costs are covered by the polluter.

The theory is that if the right price signals are given, allowing actors free choice and the flexibility to act in the manner that benefits them most, then the aims of the instrument should be more easily achievable. However, MBIs are not always appropriate policy responses. Their success depends on the right price signals being sent or that potential gains from trade exist. They should not interfere with successful regulatory mechanisms already in place and the transaction costs involved in trade must be low enough for it to be worth while. Care must also be taken when allocating property rights that they are fair and don't merely give the biggest polluters an opportunity to benefit further.

2.1 Functional mechanisms of MBIs

In order to successfully implement MBIs, it is important to know how they "work" in theory as well as practice. In respect to the general mechanisms used, MBIs can be categorised as either price or quantity based instruments. In addition, instruments aimed at improving the operation of existing markets, termed 'market-friction' instruments, are sometimes included

[5] source: http://glossary.eea.eu.int/EEAGlossary/M/market-based_instrument

as market instruments (Coggan and Whitten 2005). The categories of instrument are illustrated in Figure 1.

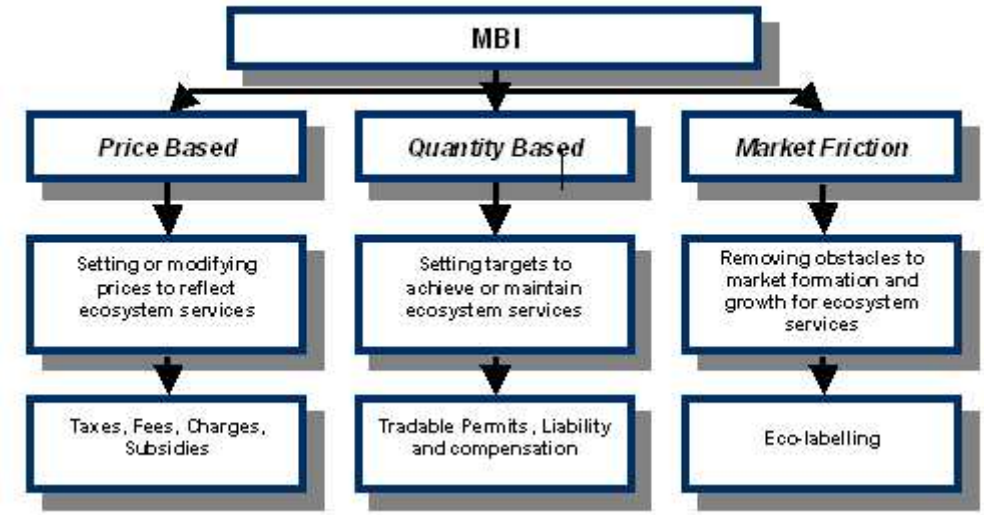

Figure 1. Functional mechanisms of MBIs (Source: after Coggan and Whitten 2005)

2.1.1 Price based instruments

Direct positive incentives in the form of subsidies/support or tax breaks or negative incentives in the form of taxes, charges and fees can be attached to environmentally beneficial or damaging activities. This gives these activities a price which they formerly lacked i.e. it is an attempt to incorporate the external costs or benefits of an action. Individuals will normally respond by adopting the behaviour which costs them least. If these signals are set at the right level this should lead to better resource use.

A disadvantage of price and compensation based instruments is that they cannot guarantee the *extent* of changes in behaviour. Since they rely on price signals rather than inducing scarcity, there is still the danger of overexploitation. Instead of generating a real new market for the public good in question, they just shift the demand curve.

2.1.2 Quantity based instruments

Also known as indirect incentives, quantity based instruments create a market by distributing permits to carry out an activity associated with specified resource uses or environmental damage. Actors may trade for rights to, for example, log woodland or emit a certain volume of pollutant. A limit is set on the number of permits, allowing, in theory, the total amount of damage to be controlled. This allows more flexibility than a tax system as those who find it cheapest and easiest to change their behaviour may make the biggest changes and then sell their permits to those who find change very expensive. These types of MBIs may be more likely to cause long-term behavioural changes but also need the greatest amount of administration.

2.1.3 Market friction

These should improve the manner in which the current market works by providing more information and reducing transaction costs. Advising consumers allows them more of a choice about what type of products they buy. Producers of sustainable products may differentiate their goods from similar goods produced by competitors in an unsustainable manner. This should allow them to gain higher revenues (if consumers value biodiversity conservation). This can be achieved through the use of certification and labelling schemes.

2.1.4 Perverse incentives

These are mentioned briefly here for completeness, though not covered in the report. These are incentives put in place by the government for a particular purpose which however, have the negative side effect that they induce behaviour which reduces biodiversity for example European agricultural policy price and production support practices of the last forty years of the 20th century.

2.2 Theoretical considerations

According to economic theory, (see, for example, Weitzman (1974)), the shape of the benefits curve (price elasticity) gives information useful for deciding what type of economic instrument is appropriate. If the curve is steep and elasticity is high, (i.e. a small change in cost will result in a large amount of benefit) then it makes sense to use quantity based instruments (such as a cap and trade system). If the benefits curve is shallow or unknown, then price-based instruments may be more appropriate.

As far as government spending goes, quantity based instruments do not require government input (except in their establishment) or generate revenue (except possibly by initially selling permits). Price-based instruments will require public money (in the case of subsidies/support) or generate public money (in the case of taxes).

The success of MBIs is of course also based on a number of assumptions about human behaviour for example, that rational individuals will respond to changes in the various costs and benefits in order to maximise the benefit to themselves.

However, such theoretical considerations assume to a large extent a case of perfect information and low transaction costs. For biodiversity, this is rarely the case, particularly because biodiversity is not an easily aggregated good. In other words, policy needs to take account of its particular quality and location, and can rarely tackle it with broad-brush instruments. As a result, MBIs are usually best:

- tailored to the particularities of the biodiversity, which in practice means applying them at the local scale

- combined with command and control regulation, which can act as a 'safety net' or a 'baseline' beyond which MBIs can then go.

2.3 Analysed MBIs

In this study we investigate traditional market based instruments (numbers A-C) and as well as so called financial mechanisms and labelling and certification (numbers D-E). For the traditional MBIs a classification based on the EEA (EEA 2005:p. 6) has been used.

A. **Environmental taxes**: any compulsory, *unrequited* payment to general government levied on tax-bases deemed to be of particular environmental relevance. Taxes are unrequited in the sense that benefits provided by government to taxpayers are not normally in proportion to their payments. **Fees and charges** are *requited* compulsory payments to the government and are levied more or less in proportion to services provided (e.g. the amount of wastes collected and treated) (OECD/ EEA database).

B. **Environmental subsidies/support**: Environmental subsidies are instruments used to stimulate changes in consumer behaviour and create new markets for environmental goods. They consist of financial assistance (often from governmental bodies) to businesses, citizens, or institutions to encourage a desired activity deemed beneficial, by increasing/reducing the operating costs for harmful/beneficial activities or by increasing the revenues of such entity for the purpose of achieving an objective (MEA 2005). The uses of **grants and funds** may overlap with subsidies but differ in that they are normally a set amount of money often distributed and administrated by an NGO. There are technical assistance grants or targeted grants for capacity building and knowledge sharing.

C. **Tradable permits**: Tradable permits are a way to provide market incentives to trade rights to pollute / develop / use natural resources. They are designed to achieve fixed reduction aims in the most cost efficient way. In the cap-and-trade approach, allowances for future emissions or development of land are sold or granted free (grandfathering) to existing polluters / developers. Trading programs have become increasingly popular over the last few years. It is mainly their assumed cost-efficiency that has brought them into focus. In addition, cap-and-trade programs offer the opportunity to choose the magnitude of environmental improvement that should be achieved.

As well as the classical MBIs, environmental agreements were also considered such as:

D. **Labelling and certification**: Labelling and certification, aims to create a link between the demand and supply side of the market and establish an advantage for those who preserve biodiversity by labelling their products as such (chapter 2.1.3).

In order to look at the widest range of possibilities, instruments that play a role in financial markets were also considered. In contrast to the above mentioned instruments, they do not create a market but increase the power of existing markets by providing financial resources (OECD 2004):

E. **Financial mechanisms:** There are various ways of trying to channel private sector activities towards activities that enhance biodiversity and away from activities that undermine conservation. **Reduction of taxes** when investing in Green equipment etc. may reduce the risks perceived by private actors. **Green venture capital funds**, like traditional venture capital funds, provide money to companies that are normally in their 'start-up' or a 'start-through' phase, in exchange for a portion of the shares in that company. In contrast to the traditional ones, green venture capital funds are not interested only in revenues but also in the production methods and the products. The companies financed must meet particular goals regarding their sustainability and environmental friendliness.

F. **Liability and compensation schemes**: Liability and compensation schemes try to ensure adequate compensation for environmental damages resulting from harmful activities or accidents[6]. Liability regimes open up the possibility for a number of markets including trading in "biodiversity offsets". Recent experience with regulatory regimes, such as wetland and conservation banking in the USA, tradable forest conservation obligations in Brazil and habitat compensation requirements in Australia, Canada and the EU, are examined.

[6] Sometimes in this context the term offsets is used (eg. Ten Kate et al. 2004).

3 Methodology

This report concentrates on MBIs that directly protect biodiversity. Biological diversity according to Article 2 of the Rio de Janeiro Convention on Biodiversity means “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part, this includes diversity within species, between species and of ecosystems”.

Efforts to preserve biodiversity may be targeted at a particular endangered species or an ecosystem. Often instruments address ecosystem services rather than trying to preserve overall biodiversity e.g. fishing stocks or forestry. This is because, their uses to humans both puts them under pressure in the first place and makes them of higher conservation priority to humans. In fact, in the environmental field, MBIs are most widely used for pollution or greenhouse gas emission reduction. Obviously, tackling these environmental problems will have secondary beneficial effects on biodiversity but these are not included in this report as it would make the scope too wide.

3.1 Literature review

The first task of the project was to collect information on the MBIs already used to address biodiversity issues. Existing databases of information such as the OECD/EEA database on economic incentives were consulted. For further data collection, a variety of sources were used, including books, journals, 'grey' literature (unpublished reports etc.) and internet documents. In addition, expert interviews were conducted and case studies provided by the consortium were analysed.

3.1.1 The Classification Matrix for MBIs

In order to simplify the literature review, a matrix was constructed (Table 1). Each MBI can be classified according to the type of instrument used and the field of application. The idea was to facilitate comparison between the instruments in use in different areas and be able to see at a glance, which instruments were most or least utilised. In addition, the classification code allows a very quick definition of an instrument (see fact sheets, Appendix A).

As fields of application, the different approaches to nature conservation were distinguished: conservation aimed at particular species and conservation aimed at entire ecosystems. Within the species category, we distinguished further between flora and fauna, because the characteristics of the good important in deciding which MBI fits best. Of course, these are slightly artificial divisions and the conservation of habitat and ecosystem leads naturally to the conservation of particular species and to some extent, visa versa, but often enough species specific conservation programmes are set up (e.g. agri-environmental Schemes (AES) to protect meadow birds).

Table 1. Classification Matrix used in this project

Field of application		Charges/ Taxes	Subsidies/ support	Trad. permits	Eco-labelling	Financial mechanis.	Liability & Comp.
		A	B	C	D	E	F
Flora	**1**	A1	B1	C1	D1	E1	F1
Fauna	**2**	A2	B2	C2	D2	E2	F2
Habitat / Ecosystems	**3**	A3	B3	C3	D3	E3	F3

3.1.2 Databases

The OECD/EEA database on environmentally related economic instruments was used as a starting point for the literature screening as it provides the most complete overview of the use of economic instruments in Europe. Entries listed under “Natural Resource Management” in the database were scanned. In addition to the OECD/EEA database, several other databases were used for the literature review (Table 2). In addition to the scanning of these databases for appropriate instruments, an internet search of grey and academic literature was also carried out and several expert interviews conducted[7]

Table 2 Sources of information

	Regional Focus	**Searching criteria**	**Background information Comments**
OECD / EEA			
	Countries within the OECD and EEA member countries	Lists of pre-defined queries: • Countries • Environmental domain (water pollution; air pollution; climate change; land contamination; waste management; natural resource management; noise; ozone layer; energy efficiency; transport land management) and • instrument categories (taxes, fees charges; tradable permits; deposit-refund systems; subsidies; support schemes; (voluntary approaches) which	The data has been collected over a number of years and combined in this joint database. Information has been collected from government ministries in the relevant countries.

[7] We would like to thank the following persons for their cooperation: Dr. Hans Vos, EEA, Copenhagen; Dr. Philip Bagnoli, OECD Environment Directorate, Paris, Nils-Axel Braathen, OECD Secretariat – Principal Administrator of the Environment Directorate, Paris; Dr. Rainer Oppermann, Institut für Agrarökologie und Biodiversität (IFAB), Mannheim, Luis Díaz Balteiro, Departamento de Economía y Gestión Forestal, Ciudad Universitaria, Madrid; Juha Hiedanpää, Satakunta Environmental Research Institute, University of Turku, Pori.

		are then sub-divided.	
Compendium of Instruments[8]			
	World-wide, generally sourced from international organisations.	Search function for: • country, • sector (e.g. environmental sector) and • instrument type, • keyword search each has a drop-down menu of options.	Collaborative project of the United Nations Division for Sustainable Development and the International Institute for Sustainable Development (IISD). Aim to provide reference to instruments that governments can use to finance conservation. Comprises about a hundred instruments, including regulatory, market-based, social, and other instruments, which are currently in place in countries all over the world.
Database of Environmental Taxes and Charges[9]			
	Central and Eastern European Countries	Selection possible for: • country and • regions.	Part of the Sofia Initiative on Economic instruments. Fairly simple database which links to factsheets of environmentally related taxes and charges in selected countries. This is also included in the OECD/ EEA database
Biodiversity Economics[10]			
	Worldwide	Search by • sectors and biomes (water, forest, marine, protected areas and species, arid, agriculture, extractive, infrastructure, financial services, pollution and climate change, trade, poverty, communities) • world regions (Africa, Latin America, West Europe, etc.)	Site run jointly by IUCN and WWF to encourage the use of economics in biodiversity conservation. It is aimed at conservation policy-makers and practitioners in the field. It provides a library of documents and also the Spider which allows searches of other select sites.
Conservation Finance Alliance[11]			
	Worldwide	Can navigate through links to various parts of the guide	Created to share information between governments, NGOs and agencies on mechanisms to finance conservation. Includes the Conservation Finance Guide which is a list of financial mechanisms and market based instruments which can be used for financing protected areas in particular. → More of reference document than database but includes case studies and many links to other useful sites.

[8] http://www.iisd.org/susprod/browse.asp

[9] http://www.rec.org/REC/Programs/SofiaInitiatives/EcoInstruments/Database/SIEI_database.html

[10] http://www.biodiversityeconomics.org/index.html

[11] http://guide.conservationfinance.org/

The references collected were organised into an excel datasheet constructed by the authors (see Appendix C). References can be searched through by category such as author, title, natural resource, etc. A similar database was constructed for the projects mentioned in the literature and summarised by being input into the matrix (Table 1). Case studies were also taken from the various countries involved in the project consortium. (Appendix B).

3.2 Case Studies

Once the literature had been summarised, promising examples of the practical use of various MBIs were chosen and analysed in more detail. Of the 204 examples identified, 31 were examined in more detail. An attempt was made to cover instruments across different categories defined by the matrix (although this was not possible for all categories). In addition the case studies provided by the consortium and from the OECD handbook[12] were used.

The chosen cases are summarised in fact sheets (Appendix A) with information about target resources and pressures; objectives; effectiveness and general judgement of the instrument. They cover the following topics:

- Charges, taxes, fees (scuba diver fees, Philippines; Sea turtle conservation, Greece; landfill tax credit, UK; Charges for land use change, CR; Aggregate Levy Sustainability Fund (ALSF), UK,)

- Subsidies/support (BushTender, Australia; outcome based payments for agriculture, Germany; Natural Values Trading (METSO), Finland; Competitive Tendering (METSO), Finland; Conservation of Iberian Lynx in Andalucía, Spain; environmental insurance, Australia) and funds (revolving fund for biodiversity, Australia; protection of flower bulbs, Turkey)

- Tradable Permits (Individual Tradable Quotas for fishing, New Zealand , wildlife credits fund proposal, Australia, wetland banking, US, Red-cockaded woodpecker trading, US)

- Eco-labelling (forestry certification, US, Marine ornamentals)

- Venture Capital (green projects scheme, NL, Tax exemptions for nature areas, NL, Free depreciation for investments in 'green' equipment ('MIA/VAMIL'), NL, Ecogift, Canada, DOEN / FFI Project,)

- Liability and Compensation (Rotterdam port, NL)

3.3 Cost effectiveness assessment

General findings in respect to the effects of the design on cost-effectiveness were taken from the case studies in order to show how (or how not to) optimise the cost-effectiveness of selected instruments and a series of policy recommendations were given.

[12] OECD (1999)

4 Results

This chapter summarises the results of the literature review in the form of tables showing the categories and number of MBI projects reviewed.

4.1 OECD / EEA database

First, data from the OECD / EEA database was examined. Overall, the majority of EU countries appear to have some MBIs of relevance to biodiversity conservation in place. A number of MBIs with probable indirect impacts on biodiversity have also been implemented (e.g. fees relating to cleanup of mining operations and many water related subsidies). These instruments are not included in the summary information below.

An initial scan of the results for the EU (see Appendix D) would suggest that subsidies / support (slightly more than taxes) are the most commonly used instrument in Northern and Western Europe (e.g. UK and Belgium). The Netherlands stands out as having implemented a wider range of different instruments. In Central and Eastern Europe, taxes and charges appear to be more common though this is variable (e.g. taxes are widely used in Poland but subsidies are more common in the Czech Republic). Southern Europe appears to make less use of market based instruments.

However, when analysing the database it has to be kept in mind, that its completeness depends on the reporting of the member states. A large number of European countries don't have any instruments for biodiversity entered. This despite the fact that they all run agri-environmental measures operated through European Funds. Ireland, France, Germany, Luxembourg, Spain, Cyprus, Slovakia, Slovenia and Latvia have no market based instruments which are used directly to preserve biodiversity included in the database[13].

There may also be differences in the way instruments are classified by the contacts from the individual countries, for example, in some cases, agri-environmental schemes might be recorded as one instrument, whereas in others they might be listed as separate support for the species or habitat concerned. Hence biases may be apparent in how countries have reported about what instruments are in use (the same is true for the analysis in chapter 4.2).

4.2 Summary of biodiversity relevant MBIs from the project database

The matrix below (Table 3) shows the distribution of market based instruments as listed in the database compiled over the course of this project. This includes instruments from the OECD / EEA database plus additional examples from other sources. Table 6 shows a list of the instruments used. This is a summary of the project database.

[13] For Germany at least, there are several agri-environmental programs in action, s. above.

Table 3 classification matrix of the project database

Field of application		Taxes / Charges	Subsidies /support	Tradable permits	Eco-labelling	Financial mechan.	Liability & Comp.	*Total*
		A	B	C	D	E	F	
Flora	**1**	7	1	2	0	0	0	*10*
Fauna	**2**	35	4	19	1	0	0	*59*
Habitat / Ecosystems	**3**	57	56	12	5	4	1	*136*
Total		*99*	*61*	*33*	*6*	*4*	*1*	*205*

In general it appears from this analysis that while price-based MBIs are well used, quantity based ones are much less common.

Taxes, fees, charges and subsidies/support are by far the most commonly used instruments across the world. The most commonly used charges include hunting and fishing permits, tree-cutting (for individual trees), charges for the import or export of animals and plants, logging permits, land use tax, forestry tax and user fees for national parks etc. Subsidies/support schemes include tree-planting, woodland support, stream restoration, land-use and agri-environmental measures. The use of other instruments is rare.

Most instruments fall into the habitat / ecosystems category. This is hardly surprising as even if the aim of an MBI is to protect an individual species, this will often best be carried out by protecting its habitat. Most instruments which have been included in the Fauna category are hunting and fishing charges. There is very little aimed at specific flora groups though charges to remove individual trees have been included in this group. Certain instruments such as eco-labels appear to barely be used, examples include fish products and forest certification often implemented internationally. There is also little in the literature about the use of financial mechanisms. This might be because it applies mainly to business actors and private firms and so is rarely included in academic or government literature.

4.2.1 Analysis of country-wide uses of MBIs

The tables below show the results within and outside the EU. A comparison shows that outside the EU, again most instruments fall into the habitat/ ecosystems category. Charges and taxes and subsidies/support are the most common instruments too. However, there are minor differences between the way instruments are used within and outside the EU. For example, wetland banking is popular in the US and tradable permits seem to be more common outside the EU for example for development rights and most commonly tradable fishing permits. Table 6 lists the most commonly used instruments from the project database.

Table 4. Use of instruments within EU

Field of application		Taxes / Charges	Subsidies /support	Tradable permits	Eco-labelling	Financial mechan.	Liability & Comp.	*Total*
		A	B	C	D	E	F	
Flora	**1**	3	0	0	0	0	0	*3*
Fauna	**2**	15	3	6	1	0	0	*25*
Habitat / Ecosystems	**3**	27	36	3	3	4	1	*74*
Total		*45*	*39*	*9*	*4*	*4*	*1*	*102*

Table 5. Use of instruments outside EU

Field of application		Taxes / Charges	Subsidies /support	Tradable permits	Eco-labelling	Financial mechan.	Liability & Comp.	*Total*
		A	B	C	D	E	F	
Flora	**1**	4	1	2	0	0	0	*7*
Fauna	**2**	20	1	13	0	0	0	*34*
Habitat / Ecosystems	**3**	31	20	9	2	0	0	*63*
Total		*55*	*22*	*24*	*2*	*0*	*0*	*103*

Table 6. List of instruments used, tested in pilot projects (PP) or proposed concepts in literature (C).

	Title	Country
A	**taxes**	
	A1 flora	
1	Charge for tree protection	AT
2	Charge for forest management and research	CA
3	Tree cutting non-compliance fees	LT
4	Charge for bush and Tree removals	PL
5	Charge for premature harvesting of forests	PL
6	Charge for wildlife use	CS
7	Tree cutting charge	CS
	A2 fauna	
8	Charge for entrance to exploitation zone (fishers and hunters)	CA
9	Charge on fishing licences	CA
10	Charge for sport fishing at sea	HR
11	Fishing charge	HR
12	Hunting rent	HR
13	Fee for hunting rights	EE
14	Fishing charge	EE
15	Nature protection non-compliance fees	EE
16	Sea turtle conservation national park, Greece	GR
17	Charge on fishing quotas	IS
18	Fee on hunting	IS
19	Charge for hunting grounds use	LT
20	Commercial fishing charges	LT
21	Hunting license fees – including for licenses to keep firearms, and for rabbit shooting and trapping.	MT
22	hunting and fishing permits	PL
23	Compensation/liability payment for conservation (hunting and protected species)	PL
24	Hunting and fishing permits	PL
25	Charge for the use of hunting grounds	RO
26	Fishing permits	RO
27	Charge for wildlife use	CS
28	Fishery resource landing tax	US (Alaska)
29	Hunting and fishing permits	US (Louis.)
30	Tax on the use of fisheries	US
31	Permits for import of species	AT
32	Hunting licences	AT
33	Permits for import of species	AU
34	Animal trapping	CA
35	Charge for hunting licences	CA
36	Charge on permit for hunting with snares	CA
37	Hunting licences	CA
38	Hunting licences	FI
39	Charge on hunting licenses	GR
40	Hunting licences	NL
41	Hunting licences	CH

42	User fee for mountain gorillas	UG
	A3 habitat	
43	Fees to visit national parks	AU
44	Raw materials tax	BE
45	Pesticide and fertiliser taxes	BE
46	Charge for materials extracted from watercourses	BA
47	Forestry charge	BA
48	Charge for overcutting	CA
49	Logging tax	CA
50	Charge to entrance to wildlife reserves	CA
51	Charge for entrance to parks	CA
52	Taxes for watershed protection	CR
53	Land converstion charges to discourage conversion of agricultural or forestry land	CEEC
54	Water effluent charge	CEEC
55	Natural resources charges /taxes	CEEC
56	Charge for multiple non-wood forestry functions	HR
57	Charge for transfer of rights on forestry	HR
58	Forest contribution charge	HR
59	Natural parks entrance fee	HR
60	Sand and gravel extraction charge	HR
61	Land use change charge	CZ
62	Raw materials tax	DK
63	Pesticide and fertiliser taxes	DK
64	Charge on entrance to national parks and monuments	GR
65	Charge to acquire grazing rights on public lands	GR
66	Tax deduction	HU
67	Fee for forest maintenance	HU
68	Raw materials tax	IT
69	Regional tax on national concessions for public goods and heritage located in the region	IT
70	Environmental improvement charge	KR
71	Fee on natural park entrance	KR
72	Reforestation charge	KR
73	Forest felling charges	LT
74	Nature protection non-compliance Fee	LT
75	Annapura Conservation Area Project (ACAP)	NP
76	Mountaineering Royalty for Mount Everest	NP
77	Gift and inheritance tax exemptions / reductions for nature areas	NL
78	Transfer tax exemptions for nature areas	NL
79	Property tax deduction for forest and nature	NL
80	Tax deduction for forest and nature	NL
81	National system of raising money for conservation	NZ
82	Batangas Scuba Divers Charge, Philippines	PH
83	Watershed protection fee for the Makiling Forest reserve	PH
84	Charge for landuse changes (in usage of forested land, or general landuse changes)	PL
85	Natural parks entrance fee	RO
86	Nature protection non-compliance fee	RO

87	Extraction of minerals from watercourses charge	CS
88	Fees to visit national parks	CS
89	Fishing permits	CS
90	Forest charges	CS
91	Ecotourism within Kwazulu-Natal Nature Conservation Service	ZA
92	Pesticide and fertiliser taxes	CH
93	Licence fee for exploitation of peat	CH
94	Raw materials tax	CH
95	Raw materials tax	GB
96	Landfill tax credit scheme	GB
97	Fertiliser and pesticide tax	US
98	Severance tax	US (Alaska)
99	Charge on grazing on public lands	US
B	**Subsidies/ support, grants and funds**	
	B1 flora	
100	Protection for flower bulbs	TR
	B2 fauna	
101	Compensation from damage caused by protected animals	NE
102	Lynx protection programme	ES
103	Subsidy for wildlife protection and extending wildlife habitats	GB
104	Goose Managment	GB
105	Direct Payments for Conservation: Lessons from the Monach Butterfly Conservation Fund	MX
	B3 habitat	
106	Catchment Care(PP)	AU
107	Revolving fund for biodiversity	AU
108	2005/2006 Second Generation Landcare Grants Program	AU
109	Farming finance: creating positive land use change with a natural resource management leverage fund	AU
110	Establishing East-west landscape corridors in the Southern desert uplands (PP)	AU
111	Auction for landscape recovery (PP)	AU
112	Multiple-outcome auction of land-use change(PP)	AU
113	Subsidies for nature conservation	BE
114	Subsidies to local authorities for nature conservation	BE
115	Agri-environmental support	BE
116	Ecological gift programme	CA
117	Agri-environmental	CA
118	Forestry cutting subsidy	CA
119	Subsidy for forest based resources	CA
120	Subsidy for reforestation	CA
121	Subsidy for conservation of soil and water courses	CA
122	Agriculture and Forestry Fund – grants, guarantees and soft loans.	CZ
123	Land care programme – grants for reserves	CZ
124	Landscape improvement programme – grants	CZ
125	Agro-environmental measures	CZ
126	Financial compensation for landowners	CZ
127	Programme for revitalisation of river systems	CZ
128	State environment fund of the Czech Republic – care for the natural environment etc. Improvement of the environment in boroughs within national parks, programme of care for the natural environment.	CZ

129	Grants for removal of land from forestry, eg, into national parks/protected areas	CZ
130	Outcome-based payment scheme for ecological services of agriculture, Germany	DE
131	Action plan for aquatic environment - wetland restoration	DK
132	Grants for environmentally friendly agriculture	DK
133	Agri-environmental	EU
134	Natural value trading (METSO)	FI
135	Competitive Tendering (METSO)	FI
136	Subsidies for ecological areas, landscape and nature conservation, pesticide-free cultivation, waste-treatment facilities on farms	GR
137	Subsidy for forestry	IS
138	Subsidy for land conversion	IS
139	Direct payments for environmentally friendly agriculture	KR
140	Subsidies for afforestation, forestry, maintenance of forests, natural resources management, protected areas, purchase of ecological areas, support for the agricultural sector	NL
141	National Trust Fund for Protected Areas	PE
142	Grants and soft loans, from debt for environment swap scheme – ECOFUND foundation.	PL
143	Subsidy for biodiversity, habitats, landscape and cultural heritage	CH
144	Subsidy for forestry	CH
145	Subsidy for lake and watercourse liming	CH
146	Subsidy for wetlands	CH
147	Subsidy for biodiversity programme	CH
148	Subsidy for ecological compensation	CH
149	Subsidy for ecological livestock production	CH
150	Subsidy for extending agricultural areas	CH
151	Subsidy for forestry maintenance and management	CH
152	Subsidy for nature and landscape management	CH
153	Subsidy for protection against natural hazards	CH
154	Green Fund Levy	TT
155	Grant for salt marshes	GB
156	Subsidy for site conservation	GB
157	Subsidy for wetlands	GB
158	Subsidy for woodlands	GB
159	Countryside Stewardship Scheme	GB
160	Lottery funds	GB
161	Subsidy for land preservation	US
162	Land use by farmers	US
C	**tradable permits**	
	C1 flora	
163	Maple grove permits	CA
164	User rights Mankote Mangrove	LC
	C2 fauna	
165	Tradable fishing quotas	IT
166	Tradable fishing quotas	PL
167	Tradable permits	AU
168	Wildlife Credit Fund (PP)	AU
169	Tradable fishing quotas	CA
170	Tradable hunting rights	CA

171	No net loss of fisheries habitat in Canada	CA
172	Informal tradable permit market for biodiverisity	CEEC
173	Fishery ITQs Chile	CL
174	Tradable fishing quotas	DK
175	Transferable fishing quotas (C)	FI
176	Tradable fishing quotas	IS
177	Tradable hunting rights	MX
178	Tradable fishing quotas	NL
179	Tradable fishing quotas	NZ
180	ITQs for fishery resources in South Africa	ZA
181	Hunting quotas (C)	GB
182	Transferable fishing quotas	US
183	Habitat quotas cap and trade system (C)	US
	C3 habitats	
184	Recharge credits (PP)	AU
185	Cap and trade for salinity (PP)	AU
186	Green Offsets for Sustainable Regional Development (PP)	AU
187	Establishing potential offset trading in the lower Fitzroy river (PP)	AU
188	Biodiversity offsets	BR
189	Habitats, biotopes	DE
190	Tradable pollution permits	EU
191	Tradable logging permits (C)	RO
192	Tradable development rights for pineland management	US
193	Wetland banking	US
194	Conservation banking	US
D	**eco-labelling**	
	D2 fauna	
195	Eco-labelling fish	World Wide
	D3 habitat	
196	Agricultural eco-labelling	DE
197	Agricultural eco-labelling	GR
198	Forest certification	US
199	Eco-labelling local foods	US
200	Eco-labelling coffee	World Wide
E	**financial mechanisms**	
	E3 habitats	
201	Green Financing in the Netherlands	NL
202	Green Investment Funds: Organic Farming	NL
203	Free depretiation for investments in ‘green’ equipment	NL
204	Quadris	GB
F	**liability and compensation**	
	F3 habitats	
205	Rotterdam Port example: compensation according to the Habitats directive articles 6, 12 and 16	EU

5 Theoretical Considerations to Optimise the Cost-Effectiveness of Market Based Instruments

The main evaluation criteria for a measure should be cost-effectiveness. The use of MBIs instead of traditional command and control instruments is only reasonable, if the cost-effectiveness of the new alternative is higher and hence they improve the efficiency of the nature conservation policy.

Cost-effectiveness can be defined in two ways in respect to conservation policy. Firstly, a conservation policy can be considered more cost-effective than others, if the sum of the costs[14] needed to achieve a given conservation goal is lower than for the other policies. This definition is useful in a situation with a given conservation aim such as attempting to ensure the survival of an endangered species where it is of interest to find out how this goal can be achieved as inexpensively as possible. The second definition concentrates on the output. In this case a conservation policy can be considered more cost-effective than others if it generates a higher level of conservation for a given amount of costs. This definition is useful, if policy makers want to maximise the conservation output for a given available budget.

Up until now, only limited information has been available about the cost-effectiveness of different measures in the field of nature conservation. One reason is that the effectiveness of the instruments has been insufficiently evaluated. A second reason is that calculation of the true costs has rarely been carried out. In this chapter, a methodological framework is presented along with an overview of general findings.

Wätzold and Schwerdtner (2004) distinguish between the following costs associated with conservation measures:

- **Production costs** (costs for the actual conservation activity, like grants, or payments under AES.)
- **Implementation costs** (monitoring and enforcement)
- **Decision making costs** (how much information is necessary to make appropriate decisions, including acquiring the relevant scientific knowledge, the production costs /level of compensation to land-users)

Production costs: Costs and benefits of a given measure may differ according to their location and when they are carried out. The main reason for spatial differences in costs are the different opportunity costs. This could be the varying development potential for land or costs of labour. An example of a measure whose usefulness varies with time is mowing. There is often a trade-off between the quality of hay as fodder and the benefits for conservation. The later mowing is carried out, the poorer the fodder quality and hence the higher the opportunity costs in terms of forgone income but the better the effects for conservation.

Implementation costs: Implementation costs are defined as monitoring and enforcement costs. They arise because compliance with regulations and voluntary contracts cannot be taken for granted.

[14] production, implementation and decision-making s. frame below

Decision making costs: Decision making costs arise in the context of a particular conservation policy instrument; for the regulator who wants to design the instrument as well as for the producer who has to decide whether to participate or not. The information required is the scientific background on the natural resource and information on the production costs (Birner and Wittmer 2004). The decision-making costs also include the costs of co-ordinating decision-making if different individuals or groups are involved. These will increase with the number of people involved.

When designing an instrument, there is a trade-off between decision-making costs and other costs. For example, to minimise the production costs (necessary compensation payments) a case by case assessment of what payments should be received for what conservation measures would be of advantage. But this increases the decision-making costs in terms of the information needed to calculate different compensations.

General findings in respect of the above determinants of cost-effectiveness:

Case 1: Allocation of conservation funds when a threshold in the ecological benefit function exists. In this case a concentration of expenditures in one region is more cost-effective than an even distribution of the money (Wu and Boggess 1999, Wu and Skelton-Groth 2002).

Case 2: Implementing uniform or spatially differentiated measures. Many investigations found significant differences in either the costs (Hanley et al. 1998; Johst et al. 2002) or effects (Bräuer et al. in review process) or both (Oglethorpe and Sanderson 1999). This suggests that spatial differentiation is important to enhance cost-effectiveness of a measure. An investigation from Whitby and Saunders (1996) has shown that the potential savings associated with spatially differentiated measures can outweigh the higher transaction costs. They compared two payment schemes in England. In Environmentally Sensitive Areas (ESAs), an equal amount of compensation is paid to all land-users for a defined conservation measure whereas for Sites of Specific Scientific Interest (SSSI), individual payments are negotiated with the land-users based on their costs. The strategy under the SSSI sites requires less public expenditures than the ESA procedure.

Case 3: One measure could be applied by many different actors. Here the main challenge is (i) to find the actors who can produce the desired output at the lowest cost and (ii) to make contracts according to these costs. Due to information asymmetries, it is difficult for the regulator/principal to estimate the true costs encountered by the producers for achieving a particular aim. Hence there is the possibility for the producers to overestimate their costs in order to make a profit. The main task in this situation, is to make sure that fewer producers are able to earn a producer surplus. If this is achieved, the necessary public expenditures for achieving a given conservation aim become less and hence the measure becomes more efficient (in the economic sense). In this case auctions, similar to those conducted under the US Conservation Reserve Programme, can help to reduce the level of compensation significantly, since there is an incentive for each farmer to reveal their true costs. Compared to the individual negotiations or calculations mentioned above, the decision-making costs for the regulator are much lower. (Of course, this has been achieved by “outsourcing” the necessary information gathering to the farmer. Since the farmers should have better information about their true production costs, the overall costs of decision making should decrease.) If auctions should come into action, it must be ensured that there are enough bidders in the market. Otherwise price-fixing may occur which leads to high transaction costs (Holm-Müller 2002).

Case 4: Finding the optimal length of a conservation contract. There are two contradicting effects, which may influence the level of payments for a contract. In general, short term contracts are favoured by most contractors. But, if a conservation benefit has been created that cannot be reproduced somewhere else, the consignee/contractor can bargain for an higher payments for the new contract. On the other hand, longer contracts are often

associated with higher payments, because a premium for long term abdication of autonomy of decision has to be paid (Whitby 2000).

6 Analysis of Implementation of Market Based Instruments.

In this chapter, the results of evaluation studies of the different MBIs located through the literature review and case studies, are summarised for each type of instrument. The positive and negative features of instruments which are often used are assessed. This should make it clearer which instruments are already in use and for what areas they are appropriate.

6.1 Taxes, fees, charges

Taxes, fees and charges are one of the most common instruments used to try and change behaviour in order to preserve biodiversity. Taxes are favoured as they are, like subsidies/support, a fairly simple concept. They can also be made to follow the polluter pays principle by charging those who cause environmental damage. They are commonly applied to extracting minerals from river beds (particularly in Eastern Europe), forestry activities, charges for hunting permits and agricultural use of pesticides and fertilisers. There are few general assessments of how these instruments work. Anderson et al. (2000) examined the use of pesticide and fertiliser taxes in Europe and conclude that they have not been particularly effective. Pesticide use has been reduced, in some part because of the tax but also due to other causes such as the transition to low-dose agents (i.e. technological development). They also described how predicted rises in the tax triggered panic-buying which actually led to higher pesticide use for a short time. This indicates that it is important to set taxes at the right level in order to send the correct behavioural signals.

Apart from being used to trigger the behavioural changes mentioned above, taxes can play an important role for a national conservation policy by **generating the necessary revenues**. This is especially important in countries where public money for nature conservation purposes is very limited e.g. in some eastern European Countries. An example of fees for entering a national park can be found in Poland, in the Biebrza National Park (OECD 1999). Fees for specific activities in protected areas can also be of use, for example fees added to diving costs in a marine reserve in the Philippines (see factsheet 1.1). This is of use because tourists should be interested in preserving the sites they come to visit and are less likely to notice a small increase in fee. It is also fair because tourism can also be very damaging to delicate ecosystems. It has also been proposed to charge tourists fees on the Greek Island of Zakynthos (see factsheet 1.2) to try and reduce the pressures on the sea turtle *Caretta caretta*.

Any use of charges or taxes in order to avoid environmentally harmful behaviour must be frequently evaluated regarding it's steering effects. In the Czech case of the "Charges for land use change – land functioning as forest " charges are relatively low with respect to the market value of such land and hence the charge just generates income but has limited effect on behaviour. The case of pesticide and fertiliser tax, also shows the importance of setting taxes at a sufficient level and also how negative incentives should be avoided.

Advantages: Should be simple to set up; fair – normally follows the polluter pays rule, tourism charges may be aimed at those who damage resources and should also be concerned with their protection.

Disadvantages: May not be cost effective, need to set at right level, ineffective if price inelastic (i.e. buying relatively unaffected by price change); despite the simplicity of the concept, in some cases, charges in particular may need a high degree of monitoring and

administration. Generally very top-down and might not be supported by stakeholders. May not trigger long term behavioural changes. Maybe problems with the implementation due to political lobbying.

6.2 Subsidies/support, grants and funds

Subsidies and support are, after taxes, the most frequently used MBI (see also chapter 4) due to their political acceptability and the simplicity of the basic concept. Furthermore they are often the only measure that will work with existing property rights. However, while they may sometimes be widely accepted and taken up by those they are aimed at, problems have been experienced with achieving their actual environmental aims.

Subsidies/support are used extensively in agricultural policy in the European Union, previously to encourage farmers to produce more goods but now also in an attempt to achieve environmental aims. Agri-environmental Schemes, AES (factsheets 2.2, 2.7) generally pay farmers to carry out actions which will protect and improve habitats for farmland species or reduce pollution. Some payments are aimed at the protection of a particular species e.g. factsheet 2.1 describes the Goose Management Scheme in Scotland which is intended to compensate farmers for the damage caused by wild geese wintering in Scotland so that they do not scare them off their land. Simply paying farmers a certain amount of money not to put bird scarers on their land has lead to a stabilisation and increase in some areas of the (previously falling) goose population. However, as the population continues to rise, problems are likely to be once more encountered between conservation and farming aims and the payments only manage rather than resolve the problem. Similar compensations studies for the damage caused by particular species are seen in the Netherlands (factsheet 2.6) – also for geese and widgeons and in Spain (factsheet 2.12) with the well-funded European programme to protect the food supplies of the Iberian Lynx. Subsidies and support to target forest use are also common in many member states (factsheet 2.10).

There are now many studies analysing the success or failure of such AES across different member states, though these have not been carried out in a consistent manner and are concentrated mainly in a couple of countries (UK and the Netherlands) (Kleijn et al. 2003). Many of them also focus on the uptake of agri-environmental support or farmers' attitudes to them rather than whether they actually achieve their aims. In a survey of five European countries, Kleijn et al. (2006) concluded that in general, AES are ineffective in protecting farmland biodiversity. However, the problems are more to do with the design of the schemes in the various countries rather than with the theoretical concept of how a subsidy should work. Some schemes in some countries achieve their aims well. These are generally when they have clear objectives and adequate targeting which is area specific, realistic, quantitative and time delimited. They also stressed the importance of farmer training and advice. AES should be regarded as a working hypothesis that needs constant adjustment to local conditions rather than a one-size-fits-all solution. In general, as there is sufficient ecological insight and geographical information to identify the objective outcomes and targeting for potential AES, it is a matter of implementing the right prescriptions.

Some of these problems were identified independently by the Czech part of the SAPARD project (factsheet 2.4). The AES studied here were considered effective in that they were large-scale and generated a great deal of money for environmental aims. However, they were considered too broad-scale (focussing on the whole territory of the Czech Republic and not taking regional differences into account); too inflexible as the conditions were laid down for five years at a time and the control mechanisms were insufficient (only 5 % of the contracts are controlled by aerial photographs).

Subsidies have also been criticised for not being the most efficient use of the available money. There is an asymmetry of information in the design of AES in that the landowners have information about the cost of an undertaking needed to achieve the aims of a subsidy but this information is not disclosed to the agency distributing the money. This means that either the landowner makes excess money from the subsidy or, if its implementation is too costly, will not apply for it. To avoid this problem, a system of auctions for subsidies/support schemes has been established in Australia (factsheet 2.3) Germany (factsheet 2.5) and Finland (factsheet 2.11).

Funds and grants are similar to subsidies/support though subsidies/ support schemes are more likely to be paid by governments on a larger scale. Funds may be used to target the preservation of particular species, for example, the Monarch butterfly conservation fund was established by WWF in Mexico to try to preserve the habitat of the Monarch butterfly. This works by paying communities within the biosphere reserve to conserve forest by forgoing logging permits and performing conservation actions. An advantage of such a system is that it is a fairly simple idea and establishes a direct link between the economic incentive and the conservation actions. In this case, it has also helped establish dialogue between the different interest groups and create trust in the community which was previously lacking. However, despite the simplicity of the basic concept, it was found that actual implementation was fairly complex due to the social considerations which had to be taken into account. Monitoring of compliance can also be costly. Missrie and Nelson (2005) list the lessons learned from the Monarch Butterfly scheme and the important issues for setting up such a fund. These are: clear conservation goals and objectives; clear social goals and objectives; high investment in design of institutional arrangements and monitoring; institutions that enable stakeholder participation; collaboration and conflict resolution; separate organisations for fund management and disbursement, and for monitoring conservation outcomes and compliance; commitment to a long-term financial, monitoring and social involvement contract; strong field presence and communication with communities; clear, understandable and fair rules; low opportunity costs for beneficiaries to create attractive incentives and adequate political timing (political transactions may complicate implementation).

An example of a fund which worked particularly well in achieving its objectives was a fund to protect wild Turkish flower bulbs (factsheet 2.9). The fund was used to buy bulbs and distribute them to villagers so they could cultivate them rather than collected bulbs from the wild (a practice which was unsustainable in the long run). This was a success due to the fact that the supply and demand side of the market worked in the same direction e.g. it was less work for the villagers to cultivate their own bulbs rather than travelling to the mountains to collect wild ones and a higher price could be fetched for the cultivated bulbs than was previously paid for the wild ones, many of which were small and of low quality. The expenses were also not prohibitive as after the initial capital needed to buy and distribute the bulbs, the system is self-sustaining.

Another imaginative use of a fund is a revolving fund for biodiversity, piloted in Australia (factsheet 2.8). The Victorian Trust for Nature administers the fund. It is used to buy up land from landowners who are using it in an unsustainable manner the land is then put under a covenant covered by Australian law which specifies which activities may or may not be carried out on the site. It is then sold on to landowners who are bound by the covenant. This works well because the fund should be maintained without much capital input and the Trust does not have to pay for the long-term maintenance of the land. There are of course transaction costs which reduce the fund in the long term. It may be problematic keeping a balance between the amount in the fund and the property owned: for example, money may be needed quickly when an important piece of land is unexpectedly put up for sale. While it functions fairly well, transferring the idea to other areas is likely to be difficult unless a body such as the Trust already exists as otherwise transaction costs are likely to be prohibitively high. A similar approach has been tried in Finland with competitive tendering (factsheet

2.11). Here forests are put up for tender and are either hired for conservation services for certain periods or bought by the state.

In general direct payments though subsidies, support schemes grants and funds are fairly uncomplicated MBIs which establish a direct link between an environmental outcome and an economic incentive. Care has to be taken, however, that the actions carried out under payment actually translate into improvement of biodiversity. Setting the right level for payment may also be difficult which is why an auction system may be advantageous. Cost-effectiveness can be increased with differentiated payments according to a "ecological-value-index" (see for example Natural value trading in Finland, factsheet 2.10).

Advantages: Works well when there are clear objectives and adequate targeting which is area specific, realistic, quantitative and time delimited and flexible and when there is also good advice to participants and monitoring of effects. Works well when there is a need to engage private sector actors (e.g. farmers and landowners) in provision of biodiversity public goods – in this case other instruments such as taxes are not appropriate. It may be possible to tailor subsidies/support to particular conditions and make them at least partially dependant on outputs.

Disadvantages: Medium term benefit, but no long term security for biodiversity gains and may not change attitudes (e.g. when payments stop actors may well return to their previously damaging practice); continuous funding and monitoring may be problematic; 100% has to be paid while other MBIs use the power of the market to multiply their investments; needs to be adequately targeted; despite the simplicity of the idea, procedures to distribute subsidies/support may be relatively complex and bureaucratic; relies on interest from stakeholders since not compulsory.

6.3 Tradable permits

Tradable permits have proven to be an effective MBI for species conservation. Their most common use, internationally seems to be for tradable fishing quotas. A good example of how such a system works is provided by New Zealand (factsheet 3.1, casestudy 3). This system started off as a fairly small-scale scheme and has been expanded to include 93 different species. The inclusion of a large number of species is thought to have been successful in reducing by-catch as fishermen have to take out quotas for all species they catch. The rules have been kept fairly stable over time, thus building stakeholder trust, and there are few restrictions on trading. The scheme has a high level of NGO and political support and proper monitoring through observers and satellite systems exists.

Trading schemes have also been implemented in the US, Australia and several European countries such as Iceland, Norway and the Netherlands (factsheet 3.2). Mikkelsen (2003) discusses the use of tradable rights between different users of the Norwegian coastal zone fisheries. It is concluded that this can be an effective means of allowing different groups such as fishermen and those involved in tourism to use the coastal zone. For example, if tour operators wish to prevent intensive fishing in a certain area, or the building of a fish-processing plant on an attractive area of the shoreline, they could buy the rights to this activity and then not use them. However, it is problematic when the activities of different groups cause different negative externalities which impact on others in different ways. The naming and giving rights to a number of different activities involves excessive administration. The initial allocation of the rights can also be difficult. Tradable permits may therefore be more applicable where the resource in question has fewer uses and is of interest for similar reasons to different groups.

Tradable permits have also been suggested for sport hunting and fishing. MacMillan (2003) proposes their use to control deer numbers in Scotland. In most cases, however, permits are

sold at a fixed rate e.g. in New Zealand where permits for deer are sold both to game and commercial hunters to generate revenue for the Department of Conservation[15].

A trading instrument which has been developed in the context of liability regimes in the US is the concept of **wetland banking** (factsheet 3.5). In order to achieve the aim to allow "no net loss" of wetlands, developers are liable for any damage they cause to wetlands and must compensate for it by the creation of a wetland elsewhere. The scheme has resulted in private companies setting up wetland banks which create wetlands and then sell "wetland credits" to developers (Shabman 2004).

This may be classified as a tradable permit as the wetland credits can be bought and sold in themselves as shares as the prices rise or fall. It has the benefit for developers that companies selling the credits compete with each other in order to try to achieve the cheapest prices. It has the environmental benefit that new wetlands should be established. There could also be environmental problems if the replacement wetlands are not of as good a quality (though in theory this should not happen) or if they are created in places which are later developed themselves. It could also create a "licence to trash" e.g. mitigation is not seen as important when a new wetland is created elsewhere. Finally, there could be a 'deadweight' problem with purchases covering conservations that would have taken place anyway.

However, in the US, where wetlands were being destroyed at an alarming rate without compensation, the scheme is generally regarded as successful. The General Accounting Office estimates that developers have paid $64 million to mitigate damage on 1,440 acres of wetlands. Since a report by the National Academy of Sciences estimates that 24,000 acres were subject to mitigation from 1993 to 2000, a bit more than $1 billion may have been spent to obtain permits (Bayon 2002).

Advantages: Tradable permits work well when protecting a single resource with few stakeholder groups who are interested in the resource for the same reason. They may introduce collective responsibility for stakeholders to comply; may enjoy higher support than a tax and can allow for flexibility. With wetland banking, they are likely to be viewed positively by business actors as they allow developments which would otherwise be banned. For conservation organisations, they may be a means to integrate conservation aims into mainstream business which might otherwise not be allowed.

Disadvantages: Tradable permits work badly when there are many uses for a resource which have different environmental impacts. Depending on their design, they may also have high transaction costs and inactive markets EPA (2001); substantial administrative and compliance costs in registering owners and keeping track of trades. With wetland banking in particular, there are problems with defining equivalence of habitats .

6.4 Eco-labelling

Grote (2002) describes the various products covered by eco-labelling schemes. In the international agricultural market, they exist for the following product groups:

• food products: coffee, tea, cocoa, fruit & vegetables (fresh and dried) and juices, spices and herbs, nuts, oil crops and derived products (palmoil, sunflower etc.), honey, cereals and grain including rice, alcoholic beverages (wine etc.), sugar, meat, dairy products and eggs

[15] http://www.doc.govt.nz/Conservation/002~Animal-Pests/Policy-Statement-on-Deer-Control/005~Working-with-Others.asp

• non-food agricultural products: flowers, animal feeds (for production of organic meat, dairy products and eggs), grain seeds, natural pesticides and insecticides, cosmetics, textiles (cotton, leather and leather goods), cleaning and washing articles

Most of the agricultural products are based on organic farming or integrated pest management and are then labelled as being produced in an environmentally-friendly manner. Also the eco-labelling of products from the fishery and forestry sectors should be mentioned in this context e.g. the globally recognised Marine Stewardship Council (MSC) and the Forest Stewardship Council (FSC).

Certification relies on consumer interest and trust. A common problem is that there may be little monitoring to check what a label is certifying. A multiplicity of labels may erode consumer trust (Grote 2002). To tackle this problem, on a European level, guidelines ((EEC) No. 2092/91; (EEC) No. 1804/99) have been established on organic production of agricultural products and Regulation (EC) No 1980/2000 covers Eco-labelling. A review of eco-labelling in Europe and beyond (Grote 2002), finds that organic food in particular has numerous positive effects on the environment and biodiversity and that it is also big business; certified organic foods now being sold in around 130 countries. A consequent growth in the amount of land being farmed organically has been observed (a 30% increase in the EU between 1986 and 1996). Critically, consumers' willingness to pay and acceptance of eco-labels has also been growing steadily over time and future prospects are concluded to be good.

Forest Certification (factsheet 4.1) is a fairly well established method of labelling wood products so that in theory, the consumer can choose to purchase those which come from forestry managed in a sustainable manner. Several different certification schemes exist. For example, in the US, Tree Farm (American Forest Foundation), Forestry Stewardship Council (FCC), Sustainable Forestry Initiative (SFI) and the National Forestry Association Green Tag all run their own certification schemes (Fletcher 2002). These schemes have varying environmental credentials for example, the FCC is a world-wide scheme, well supported by NGOs which imposes many constraints on what a forest owner may or may not do. In contrast, the SFI is mainly supported by industrial organisations, and imposes fewer constraints. This may lead to confusion for consumers who do not know how to distinguish between the multitude of labels and may decide it is not worth paying attention to any of them. This together with the cost of certification may discourage forest owners, especially small forest owners. Efforts are however being made to standardise the certification schemes and practices.

National governments may play a part in the success or failure of eco-labels. For example, in Greece, following the Dutch and Scandinavian models, the state has played a crucial role as the organiser of participatory and consultative processes (Karageorgou). In Germany, the Government introduced the "Bio-Siegel" as a nationwide association-independent "umbrella label" for certified organic farming products. It guarantees food is produced in line with EU legislation. However there are also nine individual organic farming organisations across Germany, each with its own label and production guidelines and the Bavarian federal state also has its own labels (Volkgenannt 2002).

Labelling set up to support other objectives such as social criteria may also have implications for biodiversity, for example, Fairtrade, includes environmental criteria in its assessment. Also, geographical Indicators are labels which show where a certain product is sourced but generally also aims to maintain a type of farming which positive environmental consequences.

Advantages: Potential to affect a whole economic sector with relative small investments, support innovation, proved to work in the organic sector; cost effective; increases consumer

choice; gives sustainable production methods a market advantage; may be an alternative to banning use of resources.

Disadvantages: Finally depends on consumer interest which often is not high, proliferation of labels, limited number of criteria that can be certified – hard to identify important criteria, difficult to extend to foreign suppliers (trade implications); limited use in developing countries.

6.5 Financial mechanisms

Investment in biodiversity is rather a small and specialised sector though there has been an increase in interest in recent years. According to Frentz (2005), pro-biodiversity business has four objectives: 1. conservation of biodiversity, 2. sustainable use of biological resources, 3. positive financial returns, and 4. equitable sharing of the benefits arising from the use of biological resources. Biodiversity business opportunities exist, primarily in the sectors such as organic agriculture, eco-tourism and sustainable forestry. Companies active in the sectors that most impact on biodiversity are mostly micro, small and medium-sized enterprises (SMEs).

Tax reductions have also proven to be an effective MBI. In particular the Canadian **Ecogift-initiative** has to be mentioned (factsheet 5.5). The Canadian Income Tax Act was amended to exempt from capital gains tax all donations of ecologically sensitive lands. Hence this initiative has become known as "ecological gifts"[16]. Donation by private individual and corporate landowners of ecologically sensitive land (or milieu écosensible in Quebec), is emerging as an important tool in conserving sensitive ecosystems and biodiversity across Canada. Two-thirds of the tax on deemed capital gains associated with any ecological gift will be exempt from income tax. To date, over 300 gifts have been donated, totalling over $35 million in value. Hence the Canadian Income Tax Act is a successful example of the integration of fiscal and environmental policies to encourage the conservation of biodiversity on private and corporate-owned lands[17].

In Poland tax reductions are linked to changes in the land use. Exemption from the forest tax are offered for some categories of protected areas. In the case of low-fertility water-mud areas, the farm tax is set to 0% (OECD 1999). The Netherlands also use tax reductions widely for gifts to environmental organisations or investments which should benefit the environment (see factsheets 5.1, 5.3, 5.4). For example exemption from transfer tax when transfers are made to certain public institutions or nature protection organisations or exemption from gift or inheritance tax for gifts to nature protection organisations.

Several programmes have been set up to try and pilot biodiversity investment schemes. For example, the **DOEN-Foundation and Fauna and Flora International** (FFI) joined forces in 2004 to carry out a pilot project to invest in SMEs which could improve their performance with relation to biodiversity to help them expand and innovate (factsheet 5.2)[18]. The pilot was aimed at the EU's new member states and on creating a viable investment mechanism to catalyse policy changes so that pro-biodiversity SMEs can operate in a favourable environment. The project provides some tools e.g. company assessment, standard loan, standard costing guidelines and key indicator monitoring system. The work done by DOEN/ FFI should assist with the establishment of a Biodiversity Financing Facility by the European

[16] www.cws-scf.ec.gc.ca/ecogifts/

[17] www.ccra-adrc.gc.ca/menu.html.

[18] http://www.iied.org/Gov/mdgs/documents/MDG2-ch7.pdf

Bank for Reconstruction and Development in combination with the European Biodiversity Resourcing Initiative (EBRI). **EBRI**[19] itself was initiated in the framework of the Pan-European Biological and Landscape Diversity Strategy (PEBLDS) following the Aarhus convention. It has the broader aim of reviewing conservation financing initiatives, looking at the types of financial support which exist (such as loans, equity and grants) and giving an overview of plans for a Biodiversity Financing Facility. It is basically an information source on biodiversity and investing on different levels (European and national). The website lists sources of funding, case studies and an expertise database among other things.

There have also been attempts to establish regular investment and venture capital funds. One example is the **Terra Capital fund**[20], a venture capital fund established in 1998 by a partnership of agencies from the financial, banking and conservation sectors. It did not, however, meet the expectations of investors as it was too complicated with a steep learning curve for staff with little experience in this type of investment. Problems were also experienced due to trying to fit US models to Latin American investment without enough adjustment.

A more positive example is **Verde Ventures**[21] is an investment fund managed by Conservation International that makes primarily debt investments in small businesses (e.g. in agro-forestry, eco-tourism or wild-harvest products) which demonstrate impacts on biodiversity conservation in CI's global priority areas. Verde Ventures identifies one of its key strengths as a strong, independent investment committee. More generally the EU SME programme aims to support innovation and the setting up of new businesses. The importance of eco-innovation is mentioned though it does not have specific aims for preserving biodiversity.

Lastly, the **International finance Corporation** (IFC) has used a much smaller investment committee for its SME Program but has benefited from advice and input from a wide range of internal colleagues who are unaffiliated with the program.

Studies for mainstreaming biodiversity into banking policy and operations have indicated opportunities for exploring Venture and Equity Capital funds, however, explorations by the OECD on venture capital for environment has indicated that the differences between the timescales necessary to improve biodiversity and normal return rates for loans, may make the process difficult.

Advantages: Way of integrating biodiversity concerns in "normal" business, makes biodiversity-related business more financially attractive with low transaction costs (use of existing systems), may promote innovation.

Disadvantages: Limited scope due to smaller returns in comparison to other venture capital investments, banks may set loan conditions which do not take account of the long-term nature of biodiversity business development, problems with reconciling public good aspect with commercial investment, cost effectiveness as far as reaching actual biodiversity aims may be unclear.

[19] http://www.strategyguide.org/straebri.html

[20] http://www.ifc.org/ifcext/enviro.nsf/Content/TerraCapital

[21] http://www.conservation.org/xp/verdeventures/

6.6 Liability and compensation

While not strictly an market based instrument, liability regimes result in the internalisation of negative externalities. Associated with the regimes are a number of markets such as companies paying insurance premiums to cover risky undertakings. In general under liability regimes companies have to pay when they cause environmental damage, and so have an incentive to reduce risks. Also, even if damage occurs, then the environment can still be compensated e.g. through restoration projects funded by the polluter (which can lead to wetland banking as described above). The US has had liability regimes in place for a number of years, as have some European Member States.

The **EU Habitats Directive (92/43/EEC)** applies ex-ante i.e. before damage occurs. Article 6.4 stipulates that if a plan or project has reasons of "overriding public interest, including those of a social or economic nature" to be carried out on a Natura 2000 site, then the member state could proceed with the development, but should take compensatory measures. These measures should ensure the coherence of Natura 2000 is protected e.g. replace, to the extend possible, like with like.

The way the Directive and the specific Article has been applied across member states is variable. The variations are often the result of national implementing provisions and transposition of the requirement of the Directive. A combination of these provisions, with national existing nature protection laws that sometimes have been more strict than the provisions of the Directive have resulted in national frameworks that do not allow for flexibility. There are popular examples of inflexible approaches which have resulted in high costs such as the Great Bustards in Germany. Great Bustards (Großtrappen) (*Otis tarda*) are one of the heaviest volant birds of the world and highly endangered in Europe. This case involved the construction of a new rail track in an area frequented by thirty of the birds. The route had to be altered and an earth wall built along a section of track in order to protect them. Total costs: 23 mio DM or 380,000€ per bird[22]. Another example is that of *the Great Crested Newts and Northumbrian Water* (Ten Kate 2004), UK. This species is protected by the EU Habitats Directive and if a company causes their loss, they can be fined up to £5,000 per newt. When Northumbrian Water was upgrading its water treatment plant, it found that ten newts had moved into the concrete lagoons of the old treatment plant. The company spent two years building the newts a new pond and then hired someone to catch each newt and transfer it to its new home. Total cost: £250,000 (36,700€). The question is, was this the best possible way to spend the money or could other conservation aims be achieved using it. Another question in these cases is, what could have been the alternatives.

An example of the implementation of Article 6.4 which was widely praised, is the Rotterdam Mainport development (factsheet 6.1). Due to the continued economic growth of the Rotterdam Port area, it was expected that more space would be needed within the port. In the area of Rijnmond, it was also stated that the quality of life was under pressure from the port expansion. It was therefore decided that an expansion of the port was needed and that the opportunity should be taken to solve the space shortage problem in Rijnmond by undertaking several environmental sub-projects. The development of the plan was subject to a high level of public participation and NGOs were involved in the decision-making. An important component of the planning decision was the Environmental Impact Assessment. This determined that priority dune habitats would be damaged by the project. Mitigation and compensation measures were put in place to minimise this. Mitigation measures included situating the new port as far as possible from the dunes to minimise the effects on them. Compensatory measures included the planned creation of 100 hectares of new coastal dune

[22] Tagesspiegel 15. September 1998

area for this priority habitat and a 32150 hectare marine reserve within Northern Voordelta for other habitats and species.

The **Liability Directive (2004/35/EC)** applies ex-post i.e. after damage occurs. The aim is to make sure those causing environmental damage are held responsible. It covers land damage, water damage and protected species and habitats. It requires that an operator should take preventative action when environmental damage is likely to occur and when environmental damage does occur, the operator must take remedial action. In both cases, the operator must bear all costs. Annex 2 specifies what types of remedial actions are appropriate. Remedial actions should attempt to restore the environment to baseline conditions ("primary remediation"). Where this is not possible, "complementary remediation" should provide the same level of natural resources / services at an alternative site which should if possible be geographically linked to the original site. "Compensatory remediation" should compensate for a temporary loss of natural resources pending their recovery. The directive states that where possible, when defining remedial measures, a resource-to-resource or service-to-service equivalence approach should be used.

By introducing liability, one provides strong incentives for insurance. If the market develops with insurance premiums differentiated (according to practices and riskiness), then this imposes through the market, a strong incentive for better practices.

Advantages: in general, threats of liability should mean that companies take care not to cause pollution. They may also have to have insurance to cover themselves and this can act as an incentive (through differentiated premiums) to minimise risk. It can encourage the development of markets such as wetland banking.

Disadvantages: Taking companies to court is costly and risky. Deciding on the compensatory actions needed can also be difficult.

7 Most Promising Examples

The last chapter described examples of how MBIs are commonly applied and summed up the positive and negative aspects. This chapter, describes a number of unusual examples of MBI application or pilot projects being run. This should help to highlight positive examples which could be put to further use. The instruments have been divided into the same catagories as in the previous sections. However, some of the most promising examples are actually a combination of instruments, e.g. the first example describes a tax-credit used as a fund and the habitats banking is a method of trading compensation credits.

7.1 Taxes, fees and charges: The UK Landfill Tax Credit Scheme (LTCS)

Appendix B, case study 1 (factsheet 1.4) describes the landfill tax which was introduced in the UK to reduce the disposal of waste through recycling, composting and more environmentally friendly waste management measures. It increases the financial cost of landfill to properly reflect the environmental costs. The LTCS enables landfill operators to donate a portion of their tax to environmental projects. In return they receive tax credits. The donation is then put into a fund which can be accessed by registered environmental bodies planning to carry out projects within ten miles of the landfill sites. Projects funded include restoration of habitats, control of invasive species and urban biodiversity projects. The LTCS has worked well as a way to compensate the local environment and local communities from the negative effects of the landfill site. It has encouraged partnerships to develop and improved relations between communities and landfill operators as well as giving a much needed boost to biodiversity funding. This is a good way not only to use a tax to discourage environmentally damaging behaviour but to put the funds collected towards environmental aims. A similar scheme is used to reduce the negative environmental effects of material extraction in the UK with the Aggregate Levy Sustainability Fund (ALSF) (factsheet 1.5). It is thought that this type of scheme works well for something like landfill where there are a small number of operators but might not work so well for farming, for example, where there are a larger number of stakeholders.

7.2 Subsidies/support schemes, grants and funds: Results orientated subsides, auctions and insurance grants

In Germany, the University of Goettingen has developed the Northeim Project (factsheet 2.5), an economically as well as ecologically sound **result-oriented payment scheme** for environmental goods and services in agriculture for the *Landkreis* Northeim in the Lower Saxony Region[23]. The scheme deals with ecological goods such as landscape structures (hedges or balks) and grassland rich in forb species. A Regional Board representing all relevant stakeholders in the field of agriculture and environment– including the environmental and agricultural administration of the *Landkreis*, the farmers' association and the environmental groups - was established. This committee aimed to clarify the public demand

[23] interdisciplinary R&D project BIOPLEX on „Biodiversity and Spatial Complexity in Agricultural Landscapes under Global Change" (2000-2006)

for ecological goods and to allocate the funds through a placing procedure. This procedure included bidding for components of landscape protection in order to create competition among the participating farms. Since compensation payments are not linked to the farmers opportunity costs, the value of the produced goods (occurrence or increase in numbers of relevant species) needs to be estimated separately. Therefore knowledge and willingness to pay for the provision of ecological goods of agriculture of the local population were assessed through a contingent valuation survey. The initial results of the current project phase indicate that participation and effectiveness are high (Richter gen. Kemmermann et al. 2005). First attempts to test the transferability of this approach are planned for other parts of Germany (see, e.g., Fischer et al. 2003; Gerowitt et al. 2003).

Groth (2005) concludes that the design of the scheme ought to ensure its success as it is based on fundamental criteria of market economy such as supply and demand. Also the integration of an auction system and the fact that it is outcomes-based and considers the needs of a variety of stakeholders should increase its chances of achieving its objectives. The first survey of farmers in the region suggests that it can work not only as a theoretical concept but as a practical scheme at least in the case-study region.

Another way to link payments to results has been piloted in Australia where a system of **auctions for biodiversity** outcomes has been set up. Known as BushTender (factsheet 2.3), this involves identifying an area where action is needed and discussing with landowners the conservation actions they could carry out. The landowners then submit sealed bids describing the level of funding they require to carry out the prescribed actions. The bids are assessed according to 1. The vegetation type; 2. The contribution to biodiversity benefits which should accrue from the promised landholder actions; 3. The price the landowner wants for the promised actions. The best value bids are accepted until the funds run out.

This system encourages landowners to reveal the real cost of carrying out an action. Of course the system requires more administration than merely distributing subsidies. There is also a danger that the cheapest individual bids will be chosen and that these may not act together to achieve environmental aims, for example, to address diffuse pollution, it would really be necessary for all farmers in an area to work together, not just those who were willing to reduce their fertiliser input most cheaply. However, if the system pays for environmental outcomes rather than inputs and attracts enough interest, it could be more cost efficient for certain types of environmental aims.

A similar method of selecting the most valuable proposals has been implemented in Denmark within the scheme “Economic incentives for the transformation of privately cultivated forest areas into strict (untouched) forest reserves in Denmark” (OECD 1999). This system of grant aid was introduced in 1994 and aims to create an incentive to transform privately owned cultivated forest areas into “untouched” forest. Compensation is paid according to the **ecological value** of the forest and how much of it has been put aside. Among the proposals, the most valuable are chosen by the local state forestry authorities for a survey with participation of the owner, the Forests and Nature Agency (central forest authority) and 2-3 experts on biodiversity. The programme is viewed as having been a success both in respect to the total area and the numbers of agreements. The success is put down to the voluntary nature of the programme and that the compensation is high enough to interest forest owners. Further more it’s flexibility has been pointed out. The programme offers the possibility of future harvesting with adjusted compensation payments.

Setting up purely outputs based payments face certain difficulties. However, while landowners may consider it too risky to agree to be paid just for the biodiversity effects of their actions, a combination of some compensation payments and some results payments may be cost-effective and acceptable to all actors. An example of payments for the preservation of endangered species is provided by the example of wolves in the US OECD (2004). What makes this approach of interest is that not only is compensation paid, if farmers

suffer losses of cattle/sheep, but also a bonus payment, if wolves stay permanently on the area of the farm. Landowners are paid USD 5000 for each pair of mating wolves on their ground. This gives farmers an incentive not only not to shoot wolves on their land but to actively try and make the habitat suitable for their survival and breeding.

7.3 Tradable permits: Mitigation banking with protected areas or endangered species

In most countries any action that harms an endangered species is forbidden by law (e.g. Endangered Species Act, USA or Red Data Book/FFH, Europe). These regulations may create an incentive not to declare the discovery of an endangered species, to make land inhospitable to them or even to destroy them (Marano and Lieberman 2005). A concept that has recently attracted interest to get round this problem is biodiversity offsets applied in a similar manner to the US concept of wetland banking. Biodiversity offsets have been defined as “conservation actions intended to compensate for the residual, unavoidable harm to biodiversity caused by development projects, so as to ensure no net loss of biodiversity” (ten Kate 2004). The idea behind offsets is that when developing a particular area causes harm to the biodiversity which cannot be prevented in this area, the developers have a responsibility to counterbalance the harm they have caused by creating a similar habitat elsewhere.

In the US a mitigation banking scheme transforms a chronic environmental liability into a marketable asset. In this case, the liability/asset is an endangered bird, the red-cockaded woodpecker (Picoides borealis) (Environmental Defense 1999)[24]. Conservation groups set parts of a forest aside to promote woodpecker breeding, wood companies may then effectively buy the rights to displace another pair if a pair has breed in the set-aside part of the forest. Woodpecker credits have been traded for $100,000 on a market that resembles a nascent Chicago Board of Trade Bayon (2002) (see factsheet 3.4).

An important difference between normal mitigation banking and banking of endangered species is that only existing assets are accepted and no options of development credits. For the woodpecker example this means that only if new mating pairs can be proven to exist, can habitats with other mating pairs be destroyed. The costs of monitoring such a system, however are high.

7.4 Eco-labelling: Marine Aquarium Council

Setting up eco-labels is only financially worthwhile if there is a market advantage in being certified with the label. Factsheet 4.2 provides the example of the Marine Aquarium Council. Many fish and other sea-life intended for aquariums in developed countries, are harvested from reefs in developing countries in an unsustainable manner for example using cyanide or explosives. In the 1990s, the trade in marine ornamentals was worth USD 10 billion (OECD 2004) and provided a welcome source of income to those living in the vicinity of reefs. However, the manner of collection was putting the reefs under serious stress, which was not only leading to a loss of biodiversity but also a potential loss of business to those harvesting the ornamentals. The buyers were also not satisfied as much sea life bought for aquariums died shortly after. Setting up an eco-label therefore was a step which benefited all of these groups.

Government **public procurement** is also of growing interest to boost environmentally friendly certified production. Since public bodies are large consumers of goods, if for example

[24] www.environmentaldefense.org/article.cfm?ContentID=2664

they procure wood and paper products from well-managed forestry then this has the potential to greatly increase the benefits to those wood owners who make the effort to achieve certification of their forests. For example, in the UK, the Central Point of Expertise on Timber (CPET) has been established to advice government bodies on how to procure timber from legal and sustainable sources. Several other member states (Denmark, France, the Netherlands and Germany) have implemented such policies as well. The policies however vary between the countries and in what they are applied to e.g. the Danish policy applies to only tropical timber whereas the Dutch and British apply to all sources, inclusion of social criteria etc. A recent report written for the Commission identifies problems with harmonising approaches and stresses the role of the EU in assisting the development of national and regional standards[25]. Public procurement can also help with the strengthening of the market benefits of other types of eco-labelling for example, sourcing catering for public institutions from organic producers.

7.5 Financial mechanisms

The **green project scheme** (see Appendix 2, case study and factsheet 5.1) is intended to be used for projects related to agriculture and forestry which are expected to be profitable but with a lower profitability than the current market rate of return and therefore not of interest to investors. By exempting the projects from income tax, they become more competitive in the market. This scheme has so far been successful but uncertainty about its future is an important potential failure factor. It is however fairly popular with savers and investors of which there were 188,000 in 2004.

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[25] Mechel, F., Meyer-Ohlendorf, N., Sprang, P. (2006) Ecologic in co-operation with Chatham House: Public Procurement and Forest Certification.

8 Policy Recommendations

In order to implement market based instruments successfully, it is important to consider specific key features. In particular, incentive measures need to be designed with the specific characteristics and needs of the individual communities and ecosystems targeted in mind.

- **Clear objectives**

In order for a scheme to have a chance of reaching its objectives, these need to be clearly defined. It is important that all actors know what the aims of a scheme are and they should be working towards trying to achieve the same aims.

- **Defining the good**

Sometimes it may be problematic to work out exactly what efforts should go into protecting what with biodiversity conservation. Unlike other environmental problems such as CO_2 emissions it is not always clear exactly what the exact aim is. For example with something like wetland banking or biodiversity offsets, is it better to create an exactly similar habitat, no matter what the costs or is it better to preserve the greatest amount of biodiversity possible for the money given (or somewhere between the two)?

- **Consideration of Social and Economic Effects**

Policies should take into account a combination of environmental, social and economic criteria. It is perfectly possible for an instrument to be established that appears to be cost-effective and is accepted by the local population but does not deliver its environmental aims. Also, some schemes may not work because they are socially unacceptable. This was a problem with the Greek case study (factsheet 1.2), where it was felt that new rules were being imposed by outsiders who didn't know the area and where trying to decrease local profits. An early and continuous involvement of stakeholders should help clarify how different groups will view the scheme.

- **Unexpected environmental effects**

An evaluation of the environmental effects of an instrument, should not just look at the natural resource which the instrument was set up to support. If incentives are given to try and prevent the depletion of one natural resource, this may have negative effects on something else. The Greek case study (factsheet 1.2) again provides an example of this where development credits were given to develop other parts of the island which could negatively impact on other ecosystems in a way not previously predicted.

- **Timing**

The time over which a scheme is carried out is critical, particularly for reaching biodiversity objectives. A recurrent problem is that a fairly long time scale is needed to try and improve habitats and increase biodiversity. However, government schemes often have a short timescale making it problematic to persuade, for example, landowners to enter into a scheme where they have to make long-term commitments. A balance has to be found between making a scheme attractive to participants and effective in achieving its aims.

- **Flexibility**

It is generally seen as desirable to increase the flexibility of incentives for biodiversity. This is one advantage of market-based incentives over traditional CAC measures which are less flexible. There are also different degrees of flexibility that can be granted through an MBI. For example, with biodiversity offsets, is it most important that exactly the same habitat-type and quality is replicated or that the money is used to achieve the maximum gains for biodiversity?

- **Combination**

The way in which different types of incentives combine is very important. If market forces and an instrument work in the same direction then it is unlikely that problems will be experienced. A good example of this is the Turkish bulbs case (see factsheet 2.9), in which the implementing the policy actually lead to market benefits for those involved. If instruments are to work against the market (and the majority of them have to), they must have enough finances to do so successfully. Care must also be taken that different incentives work in the same direction. Often one government incentive will encourage negative behaviour at the same time as another incentive is used to try to correct it (perverse subsidies).

- **Managing and Monitoring**

It is essential that these activities are also funded as part of the set up of an instrument. Monitoring for cheating is necessary as is advice to participants. Having a group responsible for the managing of the instrument should allow it to be adjusted if it is not meeting with success in its present form.

- **Pilot studies**

Related to the above point and especially important before the introduction of a totally new instrument, pilot studies must be carried out to see how stakeholders react and whether it is worth introducing a scheme on a wider scale. The Australian government for example has set up a national pilot programme for market based instruments[26]. This covers a range of instruments and is well reported, for example, see Grafton (2005) for an evaluation of the first round.

- **Credibility**

Credibility must be maintained by the administrating body for an incentive to be successful. This is particularly important where behavioural change is desired. Building up trust can take time and effort and trust created can easily be destroyed.

- **Evaluation**

Related to monitoring though less continuous, this should be thorough, covering the aim of the instrument as well as its social acceptability and cost-effectiveness. It is surprising, how often this important step is not carried out.

- **Information and Effectiveness**

In order for policy effectiveness to be assessed, adequate information is needed from the start about the biodiversity related resources including their states and the pressures to which they are exposed. Information about those most affected by the instrument is also needed in order to determine what type of instrument is likely to be most successful.

[26] http://www.napswq.gov.au/mbi/index.html

9 Conclusions

In recent years, MBIs have been increasingly put to use for biodiversity conservation. However, these uses tend to be relatively limited in their scope and to apply to specific areas or local needs. This relatively limited application is due to: (i) the fact that biodiversity components are very heterogenous in their value; (ii) lack of knowledge about successful examples; (iii) lack of experience in responsible administrations; and last but not least, (iv) scepticism from conservationists due to ethical objections to the concept of monetarisation of the lives of animals and plants.

Generally, MBIs offer an opportunity to integrate biodiversity conservation into the economic market. This has several advantages compared to the command and control (CAC) instruments used in conservation. In particular, when properly designed and used in appropriate circumstances (see chapter 8), they can achieve results beyond those of legal regulations, or at least achieve the same results at lower costs. Furthermore, there are cases where CAC approaches do not work well for a variety of reasons (e.g. implementation and enforcement issues) but MBIs could.

That said, many examples of MBIs show that they work best not as a substitute to regulatory approaches, but complementary to them. Given that this is the case, it is worth considering the various options and using some combination of MBIs and CAC methods to achieve the desired aims. Based on the particular situation (if a market has already been established or if it is possible for it to be established), the legal and social circumstances, the groups involved and importantly, the objectives to be reached, MBIs can offer policy makers new options to achieve conservation objectives in the most effective and efficient way.

The examples of MBIs used around the world have been categorised into different groups. The following report distinguishes between A. Taxes, fees and charges; B: Subsidies/support schemes; C: Tradable permits; D: Eco-labelling, E: Financial mechanisms (like green venture capital funds) and F: Liability and Compensation schemes.

Promising approaches which appear to be under-utilised and might be more widely applied in Europe are highlighted in chapter 6. Particularly promising seem to be those approaches that are output based (e.g. results-oriented remuneration) because they leave a high level of freedom about how to reach their goals while being effective, and therefore in the economic interests of the participants. Obviously, the high complexity, variability and time scales of ecological systems makes it difficult to apply result-oriented remuneration only, but it is an option where the objective is a particular component of biodiversity (e.g. species) or a particular ecosystem function).

In general, it is difficult to formulate clear recommendations of when and where to use MBIs instead of, or complementary to, CAC approaches. The main reason for this is that biodiversity is such a heterogeneous good, and so policies need to be very much tailored to local needs. The paucity of ex-post evaluations also means it is difficult to tell where MBIs are currently successful.

Even so, there are a number of examples of MBIs that work well and produce results in achieving the desired biodiversity conservation objectives. The evidence therefore points towards there being potential for their wider use – especially in conjunction with traditional regulation.

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