Manual for the Evaluation of Natura 2000 Sites in Economic Terms

Dr. Markus Leibenath
Marianne Badura
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1 Growing importance of economic information for nature conservation

In the past decades awareness that economic aspects play a role in decision making about nature conservation has been rising. More and more conservationists realise how difficult it is to get the required political support for their ambitions solely on the grounds of ethical arguments and are striving to demonstrate that conservation can also be economically profitable.

The political agenda in Europe is largely dominated by liberal economic thinking and by the overall goal of economic growth and creation of jobs. For instance, this is reflected in the Lisbon strategy of the European Union, which aims at making the EU by 2010 “the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion” (European Union 2000).

These are the baseline conditions that nature conservationists have to take into account. At the same time it is an opportunity to get away from asking for moral support and to show what benefits nature conservation has to offer society both economically and in terms of quality of life. Thus, the results of economic evaluations of protected areas like Natura 2000 sites can play an important role in legitimizing existing protected areas, in raising acceptance for certain conservation measures, and in finding the most efficient approaches to conservation of biodiversity. A number of studies reviewing economic benefits of Natura 2000 have already been produced (e.g., Getzner et al. 2002; Brink et al. 2002).

However, sound economic evaluations are time-consuming and methodologically demanding. Most evaluation techniques will only yield usable results if carried out on the basis of in-depth economic expertise.

Therefore, the intention of this manual is not to enable conservationists to carry out economic evaluations by themselves. Instead, the objective is to allow staff members from conservation authorities to become competent partners of economists who will do the studies. This requires to be able to analyse a given decision problem and to define needs for economic information. Furthermore, conservationists must know about the potential and limitations of economic evaluation methods, and they ought to be able to decide what type of method can be used to obtain a certain type of information. Finally, the manual shall offer guidance for contracting an economic evaluation study and for critically analysing the results.

Thus, the primary target group of this publication is not resource economists or students of economy. Instead, the manual has been written mainly for practitioners from conservation authorities, non-governmental organisations and funding institutions.

Originally, the manual was related to a training programme on economic evaluation of protection and management of Natura 2000 sites in Latvia. This programme was an integral part of a larger project on “Management of Natura 2000 sites – needs, possibilities, perspectives” in Latvia that was launched by the Baltic Environmental Forum (BEF) in 2003.

The text makes use of existing literature on cost-benefit analyses and on economic evaluations of protected areas. By taking a closer look at the overall situation, it becomes evident that most authors have mainly dealt with sophisticated details of individuals methods. What is often ignored is the practical use of economic evaluations for political decisions. This may be one reason why “hardly any results of environmental economic analyses have found their way into politics” (Bräuer 2003: 485). Hence, this manual is supposed to contribute to closing that gap as it emphasises links between decision-making problems and evaluation techniques.

The manual is divided into four main chapters. First, a brief introduction into the objectives and the principles of Natura 2000 is given for those readers who are not familiar with this European network of protected areas (Chapter 2). The following chapter explains the concepts of costs and benefits, and unfolds typologies of those costs and benefits that are relevant to nature conservation (Chapter 3). Then the methods for valuating costs and benefits are explained. This chapter starts with systematization before giving recommendations for choosing a specific method (Chapter 4). The final chapter includes more detailed descriptions of the three of the most important measures: Contingent Valuation, Travel Cost Method and a combination of methods for measuring economic effects of protected areas on tourism (Chapter 5).

The annex includes a case study on how to formulate terms of reference for an economic evaluation of a nature conservation project. The project is the removal of a dam in the Salaca River near the town of Staicele. This measure is part of the management plan for the future Natura 2000 site the “Salaca River Valley” in the Northern Vidzeme Biosphere Reserve.
2 Natura 2000 – a European network of protected areas

2.1 Selection of Natura 2000 sites

The term “Natura 2000” was introduced in the EU Directive on the conservation of natural habitats and of wild fauna and flora (Council Directive 92/43/CEE of 21 May 1992 – the “Habitats Directive”). However, Article 3 of the directive stipulates that the network shall also include the protected areas that have been designated according to the directive on the conservation of wild birds (Council Directive 79/409/EEC of 2 April 1979 – the “Birds Directive”). Natura 2000 is intended to become a coherent network of protected areas in order to protect wild animals and plants as well as their habitats.

The selection process of Special Protected Areas (SPA’s) according to the Birds Directive is simple in comparison to that of Special Areas of Conservation (SAC’s) based on the Habitats Directive. The Birds Directive just requires the Member States to classify the most suitable territories in number and surface area in order to preserve, maintain or re-establish a sufficient diversity and area of habitats for those species listed in Annex I of the directive. The directive does not include any further details regarding the selection process (Birds Directive, Art. 2 f.). However, the selection of SPA’s was mostly based on the results of an inventory of Important Bird Areas (IBA’s) which was prepared by the non-governmental organisation BirdLife International. It was based on a clear set of criteria developed in the 1980’s by experts from the Member States, the European Commission, and the BirdLife International.

In contrast, the provisions of the Habitats Directive are much more detailed. Also the scope of the directive is much wider as it comprises not only one class of animals like the Birds Directive but basically all threatened wild animal and plant species as well as their natural habitats. Annex I of the Habitats Directive lists the habitat types and Annex II contains the animal and plant species of Community interest whose conservation requires designation of SAC’s. Annex III includes criteria for selecting those sites that are eligible for identification as sites of Community importance (SCI’s) and designation as SAC’s (see fig. 1).

The so-called “biogeographical regions” play a major role in the process of designating Natura 2000 sites on the European level. The territory of the future 25 EU Member States plus the two Accession states Bulgaria and Romania has been divided into nine such regions. Latvia and Estonia belong to the boreal region while Lithuania belongs partly to the boreal and partly to the continental region.

The implementation process is based on two spatial units: the territories of the EU Member states and the biogeographical regions. It passes through several stages (Article 4, Habitats Directive; see fig. 1). However, in Latvia all potential Natura 2000 sites were designated as protected areas by national law already before national list was submitted to the European Commission in May 2004. The selection of Natura 2000 sites was mainly based on the existing network of protected areas to which 122 new sites were added. In total, 336 sites were proposed, including 4 strict reserves, 3 national parks, 250 nature reserves, 38 nature parks, 9 protected landscape areas, 9 nature monuments and 23 micro reserves.

2.2 Maintaining and financing Natura 2000

When thinking about the potential economic effects of Natura 2000 sites, it is important not only to know how they are designated but also how they shall be maintained and financed.

Maintenance requirements are derived from the overall functions of Natura 2000. According to the Habitat Directive, Natura 2000 shall contribute to maintaining or restoring a favourable conservation status of natural habitats and species of wild fauna and flora of Community interest. Furthermore, the Member States are obliged to:

- establish the necessary conservation measures involving, if needed, management plans etc.,
- avoid the deterioration of habitats and the disturbance of species for which the areas have been designated,
- assess the implications of any plan or project not directly connected to the management of the site, but likely to have a significant effect on the protected area,
take compensatory measures necessary to ensure that the overall coherence of Natura 2000 is maintained if a plan or project, in spite of negative assessment and in the absence of alternative solutions, must nevertheless be carried out for imperative reasons of overriding public interest (Habitats Directive, articles 2 and 6-2).

In most cases land owners can continue to use the land as they did before. For many habitats in cultural landscapes that have only been created due to human activities this is even a prerequisite for maintaining a favourable conservation status. Every six years the Member States have to draw up a report on the implementation of Natura 2000 and on the conservation status of the natural habitat types and species of Community interest (Habitat Directive, articles 6-1, 6-3, 11 and 17).

Article 8 of the Habitats Directive states that there will be some co-financing from the European Commission for implementing and maintaining the Natura 2000 network, based on estimates of the relevant costs by the Member States. Although different financial estimates and different ways of financing are under consideration, it remains unclear to what extent and how the Member States will get financial support from the Commission. The programme LIFE Nature that is currently dedicated to financing Natura 2000 has a very limited budget. It amounted to 300 million Euro for 2000-2004, which is insufficient if compared to the estimated future annual costs of 3.4-5.7 billion Euro for Natura 2000 (Working Group on Article 8 of the Habitats Directive 2002: i).

2.2 Particularities of Natura 2000 from economic perspective

There are three unique features of Natura 2000 that could be relevant for its economic effects:

- Similar conservation standards and a common name for protected areas all over Europe,
- High profile,
- Opportunities for branding.

Before the Habitat Directive came into effect, there have been a broad range of different conservation categories in Europe. Each country had its own classification of nature reserves, landscape conservation areas, natural monuments and so on. Some names like national park are used in most countries, yet they are used to classify different things. That is why for instance a national park in Scotland might not have much in common with a national park Sweden. Even the efforts of the World Conservation Union towards standardization (IUCN and WCMC 1994) could not cure this problem. There is also a multitude of international conservation categories like the World Heritage Site, the European Diploma or the Ramsar Site, which have been awarded only to a small number of protected areas in Europe. To sum it up, this leads to a very fragmented picture.

To an extent, Natura 2000 has changed this situation. While various national and international categories persist, they are largely superseded by Natura 2000. For the first time ever, there is a type of protected areas that bears the same name and follows the same criteria for designation in all EU Member States. Additionally, the same mechanism for surveillance and monitoring is applied to all Natura 2000 sites. This leads to the conclusion that Natura 2000 sites are easy to compare across different countries. Therefore, Natura 2000 could develop a very high profile.

Standardized quality and a high profile – these are the ingredients of a brand. Natura 2000 has the potential to become a European brand name for high quality nature conservation. The opportunities for false labelling are much lower than in the case of other categories of protected areas. This is due to the fact that conservation requirements are the same, and disputed cases can result...
3 Natura 2000 in economic terms: values and costs

3.1 Someone’s benefit may be someone else’s cost

Costs and benefits or the value of something can only be determined if looked at from a specific perspective. This can be the perspective of an individual, of a group of individuals or of society as a whole. Overall, monetary value shows the importance of a project in the eyes of a certain subject as well as the subject’s willingness to pay for it. On the society level, a value represents the ability to commit resources to something (Bräuer 2003: 485).

The issue of perspectives is crucial to the understanding of costs and benefits. This can be exemplified by the case of designating a protected area in an agricultural landscape. For the farmer who owns and uses land conservation represents a cost because he has to comply with the regulations. For the society as a whole, this may be a benefit because a large number of people will enjoy better drinking water or a visually more appealing landscape due to the conservation regime. In contrast, if the farmer receives compensations for conservation, this is a benefit for him but a cost to the taxpayer (Task Force 1998: 16-18).

The issue of perspectives is important when it comes to calculating and comparing costs and benefits. However, the general definitions of costs and benefits that are given in the following chapter are independent from the perspective that might be adopted in a specific case.

3.2 Types of values and costs of Natura 2000 sites

Various costs and benefits or values can be attributed to conservation measures such as designating and maintaining Natura 2000 sites. They may occur on-site or off-site. Another distinction can be made between present and future effects. However, the most consistent and practicable typology is based on the categories “use values”, “non-use values”, “direct costs”, “indirect costs” and “opportunity costs”. If all values have been quantified, they can be summed up as the “total benefits”. Likewise, the “total costs” are the sum of all costs. Bringing total benefits and total costs into relation leads to the “net benefit” (positive overall value) or “net cost” (negative overall value) (see fig. 2).
3.2.1 Use values and non-use values

Use values can be attached to natural goods that are either consumed directly, e.g., through harvesting or recreation, or used indirectly as in the case of ecosystem services (Bräuer 2003: 485).

There are four types of use values: direct use values, indirect use values, option values and quasi-option values. The latter could also be regarded as non-use values because they are not related to present use but rather to a potential future use. Direct use values are derived from direct use or interaction with a protected area’s resources and services. Such interactions can be of commercial or non-commercial nature. Commercial products are traded on the market, whereas no formal or regular market exists for non-commercial products. The value of direct commercial use can be measured in a straightforward process of directly obtaining market prices; it is more demanding to quantify the value of non-commercial use (Barbier et al. 1997: 14; Bräuer 2003: 485 f.; Task Force 1998: 12).

Indirect use values are based on indirect support and protection provided to an economic activity and property by a protected area’s natural functions or regulatory environmental services. They comprise such functions as flood alleviation, watershed protection, climatic stabilisation and carbon sequestration. Indirect use values are often widely dispersed and thus go unmeasured by markets (Barbier et al. 1997: 99; Task Force 1998: 12).

Option value is the value of something that is currently not used but could be used in the future. It is the benefit received by retaining the possibility or option of using a resource in the future by conserving it today. One important feature of option values is uncertainty: No individual knows his or her future demand for a resource and its availability in the future. The potential future use may be either direct or indirect and may include the future value of genetic information. This example is often cited as particularly important for biodiversity since untested genes may provide future benefits for agriculture, pharmacy or cosmetics (Barbier et al. 1997: 16; Dixon and Sherman 1990: 207; Task Force 1998: 12).

The notion of quasi-option value stresses the aspect of uncertainty that is associated with option values. Resources which do not have any obvious use value at present might have some use value in the future under different conditions. This is meant by quasi-option value. It is the benefit of preserving a resource in the present in the expectation that additional information will be forthcoming about the value of benefits or costs related to the resource. Quasi-option value is the value of avoiding irreversible decisions today (Dixon and Sherman 1990: 208).

Non-use values are also called passive values. They appear every time an individual has a feeling of ‘loss’ for an object that might disappear even if he or she does not use it. Non-use values are not derived from the current direct or indirect use of something. They rely merely on the continued existence of something and are not related to use. There are two kinds of non-use values: existence value and bequest value1 (Barbier et al. 1997: 14 and 99; Bräuer 2003: 486).
The existence value of a Natura 2000 site is an expression of the fact that people gain non-material benefits from the mere knowledge about the existence and assured survival of habitats or species. It reflects the benefit of knowing that the site exists even though one is unlikely to visit it or use it in any way. Existence value is the value of protecting an area in its own right (Barbier 1997: 17; Bräuer 2003: 486; Task Force 1998: 12).

Bequest value is the value of keeping a resource intact for one’s descendants. It is the personal or social benefit received by the present generation as a result of past generations leaving a resource for them to enjoy or use. It results from individuals placing a high value on the conservation of protected areas to future generations to use (Barbier et al. 1997: 17; Bräuer 2003: 486; Dixon and Sherman 1990: 201).

The following table gives examples of the different types of values of protected areas (see fig. 3).

<table>
<thead>
<tr>
<th>Fig. 3: Examples of the different types of values of protected areas</th>
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<tbody>
<tr>
<td><strong>Direct use value:</strong> Value of using the protected area for</td>
</tr>
<tr>
<td>● recreation,</td>
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<tr>
<td>● tourism,</td>
</tr>
<tr>
<td>● natural resource harvesting,</td>
</tr>
<tr>
<td>● gene pool services,</td>
</tr>
<tr>
<td>● education,</td>
</tr>
<tr>
<td>● research,</td>
</tr>
<tr>
<td><strong>Indirect use value:</strong> Protection of environmental processes and resources, e.g.:</td>
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<tr>
<td>● watershed protection,</td>
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<td>● flood control,</td>
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<tr>
<td>● groundwater recharge,</td>
</tr>
<tr>
<td>● breeding habitat for migratory species,</td>
</tr>
<tr>
<td>● climatic stabilization,</td>
</tr>
<tr>
<td>● carbon sequestration,</td>
</tr>
<tr>
<td>● nutrient retention,</td>
</tr>
<tr>
<td>● Protection of cultural and historical landscapes, sites and objects.</td>
</tr>
<tr>
<td><strong>Option value:</strong> If a scenic river valley is not used today for constructing a four lane motorway in it, one could possibly use it in the future for establishment of a holiday resort for nature-based tourism.</td>
</tr>
<tr>
<td><strong>Quasi-option value:</strong> Certain genetic resources, which presently do not have any value, can potentially be used in the future for medical or breeding purposes.</td>
</tr>
<tr>
<td><strong>Existence value:</strong> The value of protecting an area in its own right.</td>
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<tr>
<td><strong>Bequest value:</strong> The first national parks in the USA were explicitly designated for the enjoyment of future generations.</td>
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### 3.2.2 Direct, indirect and opportunity costs

Nature conservation in general and Natura 2000 in particular do not only create values and benefits but also incur costs. In order to identify the net benefit, total benefits and costs have to be charged up against each other (see fig. 2). There are three types of costs: direct costs, indirect costs, and opportunity costs.

Direct costs represent direct budget outlays for establishing and maintaining a Natura 2000 site. The costs for establishment can include — depending on the individual case — costs of designating the area, land acquisition, development of roads and facilities, preparing a management plan, and so on. Maintenance costs would include ongoing expenditures for regular management measures, monitoring, reporting, educational programmes, enforcement to protect the area, and so on (Dixon and Sherman 1990: 18 f.).

Indirect costs are an expression of damages or disadvantages that are indirectly caused by the existence of a Natura 2000 site, e.g., wildlife may cause damage outside the area itself. The fact that there is one or more protected areas in a region may also have negative impacts on the image of the region in the eyes of potential investors even if there are no direct land-use conflicts. Indirect costs often occur off-site or later in time (Dixon and Sherman 1990: 19 and 203).

Opportunity costs represent the value of what has to be given up to acquire or achieve something. Opportunity costs are the benefits that would have been obtained by putting the resource in question to an alternative use. This clearly indicates that opportunity costs always are speculative and hypothetical. Concerning Natura 2000, opportunity costs are the benefits that society or individuals lose when an area is protected. They can include commercial development options that are denied or the value of timber that could have been harvested. With regard to commercial developments, one has of course to be realistic because in most cases the option of converting a natural land area to an industrial zone.
does not really exist. Sometimes opportunity costs are already accounted for as part of direct costs, e.g., if the area was purchased or leased on the open market the price will reflect the value of alternative commercial possibilities (Barbier et al. 1997: 99; Dixon and Sherman 1990: 19 and 207).

The following table gives examples of the different types of costs of protected areas (see fig. 4).

<table>
<thead>
<tr>
<th>Direct costs:</th>
<th>Costs of establishment of a protected area, e.g.:</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>- purchase of land,</td>
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<td></td>
<td>- relocation of inhabitants,</td>
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<td></td>
<td>- infrastructure and facilities,</td>
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<tr>
<td></td>
<td>- preparation of a management plan.</td>
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<tr>
<td></td>
<td>Costs of maintenance and management of a protected area, e.g.:</td>
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<tr>
<td></td>
<td>- staff costs,</td>
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<tr>
<td></td>
<td>- maintenance of habitats (“conservation by contract”),</td>
</tr>
<tr>
<td></td>
<td>- maintenance of infrastructure and facilities,</td>
</tr>
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<td></td>
<td>- research and monitoring,</td>
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<td></td>
<td>- education and interpretation,</td>
</tr>
<tr>
<td></td>
<td>- enforcement of conservation regulations (“park rangers”).</td>
</tr>
<tr>
<td>Indirect costs:</td>
<td>Costs of complying with higher environmental standards (both in the public and the private sectors).</td>
</tr>
<tr>
<td></td>
<td>Damage caused outside the area by wildlife from the protected area.</td>
</tr>
<tr>
<td></td>
<td>Negative influence on the image of a region and its attractiveness for inhabitants, investors and visitors.</td>
</tr>
<tr>
<td>Opportunity costs:</td>
<td>Commercial development options that are denied.</td>
</tr>
<tr>
<td></td>
<td>Timber that could have been harvested.</td>
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</tbody>
</table>

**Fig. 4:** Examples of the different types of costs of protected areas

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# Cost-benefit analyses of Natura 2000 sites: making up the balance of values and costs

## 4.1 What is a cost-benefit analysis?

Cost-benefit analysis (CBA) is a method of applied welfare economics theory. Its function is to calculate the contribution of a certain project or activity to public welfare. It examines the present value of the expected stream of economic benefits and costs over some defined period of time. CBA can be used to evaluate the effects on social costs and benefits caused by any changes in the allocation of resources (Dixon and Sherman 1990: 201; Hanusch and Kuhn 1994: 555 f.).

CBA is mainly applied in the public sector. The method shares some similarities with financial analyses in business administration. However, aside from a private business, the object of a CBA usually has the character of a public good. Such goods are non-exclusive and non-rival in consumption. For example, in the case of a Natura 2000 site, which is open to public, nobody can be excluded from accessing it and there is no rivalry between different individuals; everyone can use it for recreational purposes as long as the level of use remains below the carrying capacity. This means that people can use a protected area or benefit from it in other ways (see above, values of Natura 2000 sites) without paying.

If there is no market and hence no prices which reflect costs and benefits, a CBA has to take on a similar function as markets have for private goods.

The result of a CBA is the net present value (NPV) which can be either positive or negative. The NPV is the aggregate of all relevant costs and benefits over time. It helps to decide whether the project or activity is advantageous and beneficial for the society.

CBA’s are always based on many assumptions. This makes them easy to manipulate. One of the most important assumptions is the discount rate which will be explained in the following section.

## 4.2 The art of discounting or how present costs can be compared with future benefits

As previously stated, a CBA examines the present value of the expected stream of economic benefits and costs over some defined period of time. Benefits and costs do not occur all at the same moment, they are dispersed...
over time. If an investment is made, the initial costs can be very high. Besides that there will also be certain ongoing costs. Furthermore, there is likelihood that the benefits will only be recognised after several years.

It is problematic to simply compare present benefits or costs with future benefits or costs. Because of the mechanism of interest rates, expenditures or revenues have a higher weight if they occur in the present than in future. This can be shown with the following example: if one receives earnings of 100 Euro and deposits them in the bank at an interest of 3 per cent, the amount will accumulate to 134 Euro in a period of 10 years. Or if one brings 74 Euro to the bank and receives an annual interest of 3 per cent, which would also be saved, the sum would amount to a 100 Euro in 10 years. Therefore, with an interest rate of 3 per cent a payment of 100 Euro that is due in ten years has a present value of 74 Euro.

The procedure of reducing future benefits or costs to their present equivalent is called discounting. Discounting is based on assumption about interest rates. The higher the assumed interest rate, the higher will be the calculated difference between present and future payments.

There is a simple formula for calculating the present value (PV) of future payments in which “i” is the interest rate, “X” the future payment and “t” the time period in years:

$$ PV = \frac{X}{(1 + i)^t} $$

In the example from above, the present value would be calculated as follows:

$$ PV = \frac{100}{(1 + 0.03)^{10}} = 74.4 $$

Both costs and benefits have to be discounted by using the same assumed interest rate. This can be shown by the example of a Natura 2000 site which is favourable among birdwatchers. The CBA shall cover a period of 5 years (see fig. 5).

<table>
<thead>
<tr>
<th>Year</th>
<th>Cost or benefit</th>
<th>Amount</th>
<th>Formula for discounting</th>
<th>Amount after discounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Initial costs</td>
<td>-10,000 €</td>
<td>(no discounting required for present costs)</td>
<td>-10,000 €</td>
</tr>
<tr>
<td>1</td>
<td>Follow-up costs</td>
<td>-1,000 €</td>
<td>-1,000 * [1 / (1 + 0,04)]</td>
<td>-962 €</td>
</tr>
<tr>
<td>1</td>
<td>Revenues from birdwatchers</td>
<td>4,000 €</td>
<td>4,000 * [1 / (1 + 0,04)]</td>
<td>3,848 €</td>
</tr>
<tr>
<td>2</td>
<td>Follow-up costs</td>
<td>-1,000 €</td>
<td>-1,000 * [1 / (1 + 0,04)^2]</td>
<td>-925 €</td>
</tr>
<tr>
<td>2</td>
<td>Revenues from birdwatchers</td>
<td>4,000 €</td>
<td>4,000 * [1 / (1 + 0,04)^2]</td>
<td>3,698 €</td>
</tr>
<tr>
<td>3</td>
<td>Follow-up costs</td>
<td>-1,000 €</td>
<td>-1,000 * [1 / (1 + 0,04)^3]</td>
<td>-889 €</td>
</tr>
<tr>
<td>3</td>
<td>Revenues from birdwatchers</td>
<td>4,000 €</td>
<td>4,000 * [1 / (1 + 0,04)^3]</td>
<td>3,556 €</td>
</tr>
<tr>
<td>4</td>
<td>Follow-up costs</td>
<td>-1,000 €</td>
<td>-1,000 * [1 / (1 + 0,04)^4]</td>
<td>-855 €</td>
</tr>
<tr>
<td>4</td>
<td>Revenues from birdwatchers</td>
<td>4,000 €</td>
<td>4,000 * [1 / (1 + 0,04)^4]</td>
<td>3,419 €</td>
</tr>
<tr>
<td>5</td>
<td>Follow-up costs</td>
<td>-1,000 €</td>
<td>-1,000 * [1 / (1 + 0,04)^5]</td>
<td>-822 €</td>
</tr>
<tr>
<td>5</td>
<td>Revenues from birdwatchers</td>
<td>4,000 €</td>
<td>4,000 * [1 / (1 + 0,04)^5]</td>
<td>3,288 €</td>
</tr>
</tbody>
</table>

Net present value: 3,356 €

4.3 Viewpoints make a difference

It is always important for whom or from whose perspective a cost-benefit analysis is elaborated, though sometimes the answer is clear from the outset. For instance, if the national government has to decide on building a new bridge for a national road, then the government is interested in identifying those costs and benefits, which the national population or the national taxpayers as a whole have to expect. In this example, the costs and benefits of the local population can also be considered as it is a fraction of the national population (Heikkila 2000: 172-178).

There are some nature conservation projects which are planned and implemented in the same fashion than the bridge in the example above. However, usually the situation is different in the case of nature conservation because its success depends on active participation and support of different stakeholders such as municipalities, land-owners, land-users, non-governmental organisations, private enterprises as well as regional and national governments. Each of these individual or collective actors has

Costs and benefits and thus the net present value of a conservation project are different for each group of stakeholders.
its specific perceptions, interests and resources; each of them will be affected by the respective nature conservation project in a different way. Therefore, the ratio between costs and benefits will be different for them. There might be actors whose costs will be close to zero but who will have significant benefits. Others will have to bear high costs without enjoying much of the benefits. This is why costs and benefits and thus the net present value of a conservation project are different for each group of stakeholders (see fig. 6).

Often it will not be possible to include everybody's costs and benefits in one analysis. This is due to limited capacities, which usually make it necessary to set priorities in defining the scope of the study. Furthermore, it can be difficult to do one cost-benefit analysis for a large number of stakeholders without having some sort of double counting. It has already been explained that one's benefit might be the other's cost. Therefore, in conservation projects the classification of costs and benefits differs significantly depending on the specific stakeholders' viewpoint adopted.

But whose viewpoint shall be adopted in a cost-benefit analysis? Which is the right one? There is no simple answer to these questions. If, for example, a conservation agency or a non-governmental organization orders a cost-benefit analysis, it has to be clear on how the results of the analysis will be used and for what purposes. The contracting agency must have an idea of who are the most relevant stakeholders and what kind of economic information will be the most interesting for this group.

Such specifications can only be made against the backdrop of the structure of the decision-making process as a whole.

### 4.4 Cost-benefit analysis as part of decision-making processes about Natura 2000

A cost-benefit analysis is only worth the effort if its results can be used to impact the decision-making process. Getting usable information from a cost-benefit analysis requires having a clear picture of the decision-making problem for which the information is needed. Equally important are the circumstances for making a certain decision, i.e., the kind of decision-makers involved, the timeline, the mode of decision-making, and so on. That is why an analysis of the decision-making problem should be the basis of a cost-benefit analysis (step no. 1 in fig. 7).

The next step is to identify the information needs (step no. 2 in fig. 7). Different decision-makers need different information. For example, if the national parliament has to decide on designating a land area as a Natura 2000 site, the lawmakers will be best convinced by figures that demonstrate economic benefits for their national constituency. In contrast, a mayor who has a say in issues related to Natura 2000 will be more interested in learning about economic advantages of nature conservation for his municipality. Such differences in the information needs can lead to completely different CBA designs. With regard to the examples given previously, the benefits of the national constituency will mostly be derived from non-use values; whereas the benefits for the municipality will rather rely on direct use values. The available timeline is also one of the issues to be considered when defining the information needs, i.e., sometimes decisions are made at a short notice while in other cases the decision-making process...
spans over several years.

The two steps – “analysing the decision-making problem” and “identifying the information needs” – represent a kind of frame for a CBA. To use the results of a CBA is another part of the frame (step no. 10 in fig. 7). The other steps of a CBA (steps no. 3-9 in fig. 7) are analyzed in the following section.

4.5 Steps of a cost-benefit analysis

A CBA in a strict sense includes at least seven steps – from “definition of the project” to “critical assessment of results” (steps no. 3-9 in fig. 7).

Definition of the project (step no. 4 in fig. 7) requires characterising the reallocation of resources being proposed. This means to clearly state what has to be considered as the project in question. With regard to Natura 2000, the project to decide upon can be

- to designate a single Natura 2000 site,
- submitting the list of pSCI’s of a whole country to the European Commission,
- allocating funds for the preparation of maintenance plans,
- implementation of individual maintenance measures, etc.

A project can be large or small. However, it has to be made clear as to what components the project includes. Furthermore, the project should be a subject of a political decision-making process, even though often different projects or problems are linked to each other and thus are hard to separate. But if the definition of the project actually includes several projects, it will be hard to distinguish costs and benefits.

In the next step, one has to try to identify all impacts resulting from the implementation of the project (step no. 5 in fig. 7). It is not necessary to describe the project again but rather to estimate the ecological, economic and social consequences of the project. The following questions can help to identify the impacts of a Natura 2000 project:

- What habitat types or species will be protected?
- Is the project going to affect land use patterns? Do farmers, forest companies or other groups have to change their activity patterns?
- In what way will the local population be affected? Can they continue to use the area for recreational purposes?
- Are there any conflicts with commercial interests?
- Could there be any positive effects on the local economy, e.g., tourism development?
- Is the project going to generate any indirect use values through improved ecosystem services (flood protection, groundwater recharge, etc.)?

It can be helpful to go through the list of potential values and costs of Natura 2000 projects introduced earlier. At the end of this step there should be a comprehensive list of likely impacts of the project in question. It is important to consider the criterion of additionality. It means that only those impacts have to be listed that will be caused by the project as opposed to changes that will take place anyway due to other factors (Hanley and Spash 1994: 8).

The definition of the scope of the study (step no. 5 in fig. 7) refers to the geographical and analytical boundaries as well as to the time scale of the study. It has to be specified which impacts over what period of time and for which geographical area shall be analysed. The scope of the CBA has to be directed to the information needs which have been defined before. Another important aspect besides information needs is the issue of resources, i.e., how much money and man-power is available for the CBA? In most cases it will neither be possible nor necessary to analyse all impacts of a Natura 2000 project. Usually a partial valuation might be sufficient to inform the decision-making process. Time and money required to conduct a valuation study depend on the types of costs and benefits being measured, the state and relevance of existing data and the desired level of accuracy (Barbier et al. 1997: 24-26; Heikkila 2000: 176-178; Task Force 1998: 17).

Once the scope of the CBA has been determined, the selected impacts have to be physically quantified for the defined time period and for the geographical area of the study (step no. 6 in fig. 7). The sample questions listed above could be specified in the following way:

- How many hectares of certain habitat types and how many individuals of certain species will be protected?
- How many hectares of farm lands or forest will be affected? How will yields be affected quantitatively?
- How many local residents will be affected?
- … (and so on)

The choice of appropriate economic appraisal methods (step no. 7 in fig. 7) will be discussed in detail in the following main chapter.
When carrying out the analysis (step no. 8 in fig. 7) a few operational things should be considered:

- The terms of reference for the valuation study shall be as exact as possible. If it is obvious which method shall be applied, the instructions can be already very detailed.
- Persons doing the operational work, e.g., interviews, have to be carefully instructed to avoid any behaviour which could bias the results. They should be clearly aware of the content of the study and the project defined. In case of a survey, the survey instrument (questionnaire, etc.) should be sufficiently pre-tested not to be too complex and too long in order to achieve reliable results.
- In order to make the study results comprehensible to a wider audience, consequent reporting and documentation of the preparation and implementation of the study has to be secured.
- It will often be possible (or even necessary) to use more than one valuation method and to compare or add up the results. If several estimates on the same issue are available, the range of results may reflect a more realistic picture of a situation than one single approach would have. The possibility to valuate an economic situation in a very comprehensive way, however, strongly depends on the financial framework available. For survey-based methods, it may be advisable to design the questionnaire already in a way to assess it by different valuation methods.

When the results of a study are available, a critical assessment of results (step no. 8 in fig. 7) should be done. This assessment refers to criteria such as reliability, validity, and technical and institutional acceptability of the study. Reliability and validity problems are closely linked and often go together with a deficient study design or choice of appraisal method. Reliability problems may also become relevant if the sample size of the data is too small. It is obvious that the results of a study will have more credibility if all possible constraints of a method have been considered. This includes also extensive documentation on the steps taken to exclude possible biases. The validity of a study will be higher if the choice of the appraisal method and the technical design of the study are suited for the case for which they have been or will be applied. The staff effort and time put in to guarantee a valid study design will normally pay off with good results. Institutional acceptability in that context means that the study design meets the requirements of the decision-making process which it targets.

5 Methods for valuating costs and benefits in the field of nature conservation

5.1 Classification of economic appraisal methods

There are different approaches to classification of economic appraisal methods; first of all there is the distinction between non-monetary and monetary valuation. Within the monetary valuation, the most common classification is according to market mechanisms and to personal preferences. In this manual, the most frequently used appraisal methods of these two groups will be explained in more detail.

![Fig. 8: Classification of economic appraisal methods](image)

Economic appraisal methods work either with personal preferences or with market mechanisms for monetary valuation of environmental issues.

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The first group comprises methods suitable for valuation according to personal preferences. These preferences can be expressed directly or indirectly. In the case of direct methods, the preferences for consumption of public goods are always investigated by conducting surveys. The indirect methods are drawing conclusions on consumption of public goods for which no market price exists, e.g., the environment or biodiversity. This is done by analyzing the price of private goods for which a market price is available instead. For the indirect methods, complementary or substitutive relations between the market goods (with market price) and the public goods (without market price) are decisive. That is why sometimes the term “surrogate market prices” is used with regard to these methods.

The second group of methods is based on market mechanisms. Relevant values and/or costs are linked to changes in or for protected areas and can be expressed by market prices. They are traded on markets and are ruled by market mechanisms such as demand or offer. They are also an indirect approach, as there is always a conclusion on the value of a good or function by means of a market price relationship. One slightly different category of method within the group is the so-called cost-based methods. The results (= values) are expressed in terms of costs for either avoiding damage to or replacing an ecological function or good, or costs of providing substitute services. As costs are not always identical to the values, this approach may imply some difficulties which will be explained later in this chapter.

5.2 Selection of methods according to types of costs or benefits

If the first step of CBA, the identification of the project impacts, has been finished, the second step may follow, i.e., to select the relevant types of costs and benefits for the study. The following table shows different methods to valuate different types of costs and benefits. The methods indicated have been frequently applied and are known as methods offering reliable results. However, the list of methods below does not cover all the available economic appraisal methods. As for the valuation of use or non-use values, several methods are suitable. The selection of the appropriate method will depend also on other framework conditions, e.g., data requirement and resources (time, budget) for carrying out the study.

| Fig. 9: Overview of costs and values and appropriate appraisal methods |
|---|---|---|---|---|---|---|---|---|
| **C O S T S** | **V A L U E S** | **U s e v a l u e s** | **N o n u s e v a l u e s** |
| | Use values | | |
| Direct costs | Indirect costs | Opportunity costs | Direct use values | Indirect use values | Option value | Quasi-opinion value | Existence value | Bequest value |
| Contingent Valuation Method | | | | |
| Contingent Choice Method | | | | |
| Travel Cost Method | | | | |
| Hedonic Pricing Method | | | | |
| Market Price Analysis | | | | |
| Productivity Methods | | | | |
| Damage Cost Avoided | | | | |
| Replacement Cost Method | | | | |
| Substitute Cost Method | | | | |
| Money Generation Model | | | | |

It is also possible to combine different methods in order to distinguish all relevant costs or benefits of a project, and to generate synergies between the methods applied. However, it has to be carefully checked whether there might be double calculations of costs or benefits. Examples for applying two or more different methods are indicated below:

**Example 1: Travel Cost Method / Productivity Method**
A protected forest area prevents the river running through it from silting up. ▼ This implies positive consequences for the farmers downstream ➔ the change in productivity will make out the indirect use value of the protected forest area for the farmer. ▼ The Travel Cost Method will show the direct use value of the forest area for people spending their recreational time there.

**Example 2: Travel Cost Method / Money Generation Model**
A National Park creates local employment by increasing the number of tourists in a region.
The increase of tax payments and other revenues for the municipalities in the catchment area of the National Park can be balanced by applying the Money Generation Model.

The Travel Cost Method will show the direct use value of the National Park by people travelling to visit it and to spend their recreational time there.

5.3 How to chose a method

As already mentioned, every project has specific framework conditions. In the current main chapter, an overview was given on the variety of different valuation techniques existing and the type of costs and benefits which can be evaluated by them. Where several techniques are suitable, the choice between them can be made in terms of:

- Theoretical validity,
- market validity,
- data requirements,
- skill requirements.

In order to get the results desired for the protected area in question, it is necessary to balance the benefits of using the best scientific techniques with the financial, data, time and skills limitations to be faced. (Barbier et al. 1997: 81) Reflections already mentioned above imply that it is worthwhile considering some related general points with regard to methodology and to practical outside conditions beforehand (see also chapter 4, definition of the scope of the study):

- Clarification of the time horizon for the valuation study.
- Clarification of the manpower and skills available for its implementation (different methods require different skills). This aspect is directly connected to the financial framework of the study. If several methods are suitable for a defined valuation study, the budgetary resources may decide on what method to apply.

In any case, all of the above-mentioned techniques should be technically acceptable with respect to their validity and reliability. Reliability problems will occur if the sample size of the data is too small or a survey design is deficient. Reliability is closely related to bias which can vary depending on the good being looked at (Pearce and Moran 1994).

The following recommendations on the selection of the valuation technique can be given:

- The technique should be institutionally acceptable in a way that it fits into current decision making processes; there are different views as to the acceptability of monetarizing the environment.

- It is important to consider the needs of the user(s) of valuation studies who may prefer the use of one valuation technique to another; for example, estimates obtained from Travel Cost or Hedonic Pricing models may be considered too theoretical or too complex; on the other hand, it may appear that Contingent Valuation estimates are too subjective and unreliable to support policy debate and discussion; the technique should also be user friendly in terms of how easy or difficult it is to use in practice.

- The financial cost of the study needs to be weighed against the value of the information gained.

- It will often be possible to use more than one valuation technique and compare the results; the estimates of value obtained from all single methods will be somewhat uncertain; if the analyst has multiple estimates, then the results of the estimates can be compared to each other and will be more reliable.

5.4 Short description of the most common economic appraisal methods

After analyzing a situation, one or several economic appraisal methods for carrying out a study according to the criteria described above will be taken into consideration. As certain types of costs or benefits can be evaluated by different methods, it is important to know the advantages and disadvantages of every method, especially with regard to practical application. The following description of methods will comprise all methods indicated in figure no. 8. The row will also follow the classification of figure no. 8.

In chapter 6 of this manual, the three most commonly applied methods will be explained in a much more comprehensive way, giving also some theoretical background and examples for their application. These methods are the Contingent Valuation Method, the Travel Cost Method and the Money Generation Model, thus, they will only be summarized very shortly in the current chapter.

The following structure will be applied for the short description of every method:

- Definition of the method and its basic elements;
- Stages of implementation;
- Advantages and disadvantages of the method;
- Summary of every method for practical application (time/ cost frame, data requirements).
5.4.1 Short description of the Contingent Valuation Method

Contingent Valuation is the most important method to valuate non-use values. It is a survey based method where a representative number of people are asked about their willingness to pay for a (public) good or their willingness to accept that a (public) good is taken away from them. The goods in question are not traded on real markets but on a carefully structured hypothetical market.

The different stages of implementation include:
Stage 1: Setting up the hypothetical market – in order to be able to develop an appropriate questionnaire for getting the desired results.
Stage 2: Undertaking a pre-test and redesigning the survey – in order to validate the questionnaire and to exclude any misunderstanding of the hypothetical market.
Stage 3: Drawing a sample and obtaining bids – in order to achieve valid results a representative sample of people has to be drawn, depending on the perspective of the decision to be taken.
Stage 4: Estimating bid curves – in order to balance mathematically the outcomes of the Contingent Valuation it is necessary to adapt the variables of the regression function to the real situation, e.g., to recognize protest bids within the answers received. Generally speaking, a bid curve describes the willingness to pay as a variable that depends on factors such as income, education, and political orientation. Such bid curves help to come up with a more realistic final result.
Stage 5: Aggregating data – means an interpolation of results in order to achieve comparable results for a bigger sample of the population.
Stage 6: Reporting – in order to have exact documentation of the framework conditions and the outcome of the analysis.

The main advantages and disadvantages of the method can be described as follows:

+ Contingent Valuation is an enormously flexible valuation method as it can be used to estimate the economic value of all types of benefits.
+ The results of Contingent Valuation studies can be expressed in understandable monetary terms, e.g., mean or median value per capita or per household, or as an aggregate value for the affected population.
+ Contingent Valuation has been widely used, and a great deal of research is being conducted to improve the methodology, to make the results more valid and reliable, and to better understand its strengths and limitations.
+/- Contingent Valuation can lead to biased estimates of value for several reasons (e.g., strategic or design bias). Therefore, its reliability is still strongly discussed among experts. Yet, a lot of experience has already been made available, and its methodology has continuously been improved.

Summary: Contingent Valuation

Data requirements: Extensive background information on the problem in order to correctly structure the hypothetical market and to design an appropriate questionnaire for transferring the key information to the people who will be interviewed. Knowledge on how to draw a representative sample of interviewees.

Cost range*: 3-9 man months for one economist, 4-6 man months for assistance.

Time frame*: 6-12 months.

Main fields of application: Valuation of non-use values (existence or bequest value).

Guidelines and recommendations: Thoroughly set up the hypothetical market! Make sure that the results are not subject to any unforeseen bias! Make sure to draw a representative sample of the population for answering the questionnaire!

*average values

5.4.2 Short description of the Contingent Choice Method

The Contingent Choice Method is similar to Contingent Valuation (CV), as it can be used to estimate economic values for virtually any ecosystem or environmental service. It can be used to estimate non-use as well as use values. It does not directly ask people to state their values in monetary terms, but in form of hypothetical choices or situations.
tradeoffs. The main difference from the CV is in the design of the questionnaire and the data analysis.

The Contingent Choice Method asks the respondent to express a preference between one group of environmental services or characteristics at a given price or cost to the individual, and another group of environmental characteristics at a different price or cost. It is particularly suitable for policy decisions where a set of possible actions might result in different impacts on natural resources or environmental services. In addition, contingent choice can be used to estimate monetary values, and to simply rank the options without relating to monetary values.

The different stages of implementation include:

Stage 1: Definition of the valuation problem, which means setting the exact scope of services that would be valued, and identifying the relevant population. For example, the resource to be valued in a specific site and the services it provides in a wildlife habitat. In case it is a state owned public land, the relevant population would be all inhabitants residing in the country.

Stage 2: The second step is to make preliminary decisions about the survey itself (how to conduct it, how to size the sample, who to interview, etc.). The answers will depend, among other things, on the perspective and importance of the valuation topic, the complexity of the question(s) being asked, and the financial and human resources available.

Complex background information or questions can be best explained in person. Therefore, face-to-face interviews are generally the most efficient but also the most expensive method for this. Moreover, people are more likely to complete a long survey when they are interviewed in person. It may even be possible to use visual aids such as videos or colour photographs. Mail and telephone surveys must be kept rather short, or response rates will decrease considerably. Telephone surveys are normally not appropriate for contingent choice surveys, as it is very difficult to explain the different tradeoffs or scenarios to people via telephone.

Stage 3: Survey design – this is the most important and difficult part of the process; it requires time to formulate the correct background information and to create understandable choice scenarios (time frame can be up to six months or more). The process starts with initial interviews and/or the so-called ‘focus groups’ consisting of the types of people who will be receiving the final survey (http://www.ecosystemvaluation.org/contingent_choice.htm). At the beginning, the researchers would pose general questions regarding the understanding of the issues related to the (Natura 2000) site – e.g., people’s knowledge of the site, the habitat services it provides, and perception and valuation of the site. In the second stage, the questions would get more detailed and specific in order to develop specific questions for the survey, as well as to decide on the kind of background information needed and how to present it.

Next, the researchers would test the different approaches by asking each respondent a series of choice questions, each presenting different combinations and levels of the relevant services. Potential costs of action and policy would also be presented to the respondents. After getting ideas on how to describe the hypothetical scenario and to ask the choice question, the pre-test of the survey can start. It is also necessary to simulate the survey situation through sending the survey via mail or by conducting face-to-face interviews, among others. At this point, respondents are asked to identify anything they don’t understand, and are able to answer in a way that makes sense and reveals their values for the services of the site.

Stage 4: Survey implementation – First of all, the survey sample will be selected randomly and representing the relevant population, which is done by using standard statistical sampling methods. In the case of a mail survey, the researchers must obtain a mailing list of randomly sampled citizens. In order to get the maximum response rate for the survey, a standard repeat-mailing and reminder method should be applied (for telephone surveys a certain number of calls to try to reach the selected respondents will be attempted). In case of in-person surveys, either random samples of respondents will be collected or “convenience” samples will be chosen – i.e., asking people in public places to fill out the survey.

Stage 5: Compilation and analysis of the results – The statistical analysis for Contingent Choice is often more complicated than that for Contingent Valuation, as it requires the use of discrete choice analysis methods to make conclusions on the ‘willingness to pay’ from the tradeoffs made by respondents. The analysis enables the researchers to estimate the average value for each of the services of the site, for an individual or a household involved. By extrapolating this to the relevant population, the total (or average) benefits from the site under different policy scenarios can be calculated, or the different policy options can simply be ranked in terms of peoples’ preferences.

The results of the survey might show that the economic benefits of preserving a Natura 2000 site are greater than the benefits which could be gained by permitting its commercial use. Alternatively, the results might indicate some ‘acceptable’ scenarios for economic costs and benefits arising from commercial use. The results could then be used to rank different options, and to help select the most profitable option or the one which could be accepted by any involved party.
The main advantages and disadvantages of the method are the following:

+ The method provides reliable values for non-market goods and services and their associated attributes. As the results are often expressed in relative terms, e.g., ranking of different options or selection of different tradeoffs, they are often more acceptable and credible for the audience of the study than quantitative monetary figures.

− The Contingent Choice Method requires careful preparation, pre-testing and compilation of the data collected, which means that the resources needed for its implementation are rather high.

− As the choice scenarios are predefined, people may be forced to choose options which they would not choose voluntarily.

<table>
<thead>
<tr>
<th>Summary:</th>
<th>Contingent Choice Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data requirements:</td>
<td>Extensive background information on the problem in order to communicate correctly the situation to the surveyed people, to define the hypothetical scenarios and the choice questions; Knowledge on how to draw a representative sample of interviewees.</td>
</tr>
<tr>
<td>Cost range*:</td>
<td>6-12 man months for one experienced economist</td>
</tr>
<tr>
<td>Time frame*:</td>
<td>12 to 24 months</td>
</tr>
<tr>
<td>Main fields of application:</td>
<td>Valuation of use and non-use values, mainly to investigate different policy options.</td>
</tr>
<tr>
<td>Guidelines and recommendations:</td>
<td>Correctly communicate background information; Carry out pre-testing to avoid potential biases; Carry out pre-testing until you really are aware of the key problems for peoples’ understanding of the choice questions; Make sure to draw a representative sample of the population for answering the choice questions.</td>
</tr>
</tbody>
</table>

5.4.3 Short description of the Travel Cost Method

The Travel Cost Method uses existing markets by determining a person’s value of an environmental good from what he or she spends on travelling in terms of time, travel expenditures and entry fees. It is widely used to estimate the value of recreational benefits generated by ecosystems and protected areas. In detail, the Travel Cost Method can be used to estimate economic benefits or costs resulting from changes in access costs for a recreational site, from addition of a new recreational site, from elimination of an existing recreational site, or from changes in environmental quality of a recreational site.

The different stages of implementation include:

Stage 1: Building up the “Trip Generation Function” (TGF) – the TGF can be built either for valuation of travel costs for individuals or for a zone of origin. For example, the zonal valuation may be applied for expressing the value of a Natura 2000 site for the most important tourism markets of the relevant protected area. It assumes certain values for distance, travel time and entry fees; moreover, socio-economic variables such as income, education, and age are also integrated in the TGF. Problems arise in case of multi-purpose and multi-destination trips, which make it very difficult to make out the correct value spent for the site in question.

Stage 2: Creation of a demand relationship – There are different factors which can influence peoples’ willingness to visit a certain area, the most important are higher entry fees. The demand relationship expresses mathematically the point, where at steadily increasing entry fees, the demand will be zero for visiting the site. This constitutes also the level of costs which an individual would accept to pay in order to visit the site.

Stage 3: Implementation of the study – The results of the study are based on empirical data, which can be collected by asking people (via a questionnaire) about their travel expenses at the most important access roads to a site. Another possibility is to use data of regional or national tourism agencies on nationality of tourists, overnight stays and money spent during stays of an average duration, etc. In many cases both information sources will be used to get a complete picture of the situation.

The main advantages and disadvantages of the method are the following:

+ The Travel Cost Method is particularly useful for assessing the non-commercial tourism, recreation and leisure values of a protected area or a group of areas.

+ The Travel Cost Method is rather uncontroversial because it is based on standard economic techniques for measuring values. It uses information on actual behaviour instead of verbal responses to hypothetical scenarios. It is based on the simple assumption that travel costs reflect the recreational value of a site.
There are, however, various factors which may bias the results, e.g., restrictive assumptions about the valuation of multi-purpose trips or opportunity costs of travel time (to some people travel time may not be a cost but might already be a part of the recreational experience).

The Travel Cost Method cannot be used to measure non-use values, which as a consequence, will undervalue all sites with unique qualities that are valued by non-users.

As in all statistical methods, certain statistical problems can affect the results. These include the choice of the functional form used to estimate the demand curve, the choice of the estimating method, and the choice of variables included in the model.

<table>
<thead>
<tr>
<th>Summary:</th>
<th>Travel Cost Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data requirements:</td>
<td>Number of visits per person or from each zone of origin (by conducting a survey among visitors or by using official tourism data); Demographic information about people from zones of origin; Average distance to the site in question from each zone of origin; Travel costs per kilometre (with exact definition of what has to be considered as cost, e.g., travel time).</td>
</tr>
<tr>
<td>Cost range*:</td>
<td>3-9 man months for one economist. 2-4 man months for assistance</td>
</tr>
<tr>
<td>Time frame*:</td>
<td>6 to 12 months</td>
</tr>
<tr>
<td>Main fields of application:</td>
<td>Valuation of protected areas with recreational value.</td>
</tr>
<tr>
<td>Guidelines and recommendations:</td>
<td>Before choosing the type of TCM (individual, zonal, random utility), carefully analyze the main tourist groups; Fix clear criteria for detecting opportunity costs of travel time and dealing with multifunctional trips; In case of questioning visitors, make sure to select a representative sample; Be aware of the fact that only use values can be estimated by TCM.</td>
</tr>
</tbody>
</table>

*average values

5.4.4 Short description of the Hedonic Pricing Method

The Hedonic Pricing Method is used to estimate economic values associated either with environmental quality (including air pollution, water pollution, and noise), or with environmental amenities such as aesthetic appeal or proximity to recreational sites. Generally speaking, it estimates costs or benefits for environmental services or ecosystems that directly affect market prices. Herewith, it uses existing markets – such as the housing or labour market – to determine the value of an environmental good. The basic assumption is that property values or wages reflect a stream of benefits, some of which are attributable to the environmental good (surrogate market prices). The analyst’s task is to isolate that value which is attributable to the good. The most frequent application concerns the valuation of environmental amenities which affect the price of real estate, i.e., the more the environmental characteristic changes, the more the value (of the property) will change.

The different stages of implementation include:

Stage 1: Data collection and compilation. – This refers to data on residential property sales in the region for a specific time period (usually one year). The required data include selling prices, locations and different characteristics of residential areas and properties such as neighbourhood characteristics (crime rates, infrastructure, etc.), environmental characteristics, among others. According to the individual situation, the relevant characteristics will be selected.

Stage 2: Estimation of relationship between property values and property characteristics. – This means that the resulting function has to measure the portion of the property price that is attributable to each characteristic. If variables of the relationship are correlating, their values will change in similar ways. Therefore, different functional forms and model specifications for the analysis must be considered.

Stage 3: “Translation” of the results – The results can be used to estimate the additional value by each characteristic factor. Therefore, the resulting value can influence decisions on preserving the environment of real estate property. These figures can then be compared to the cost of preserving the environment in its current status.

The main advantages and disadvantages of the method are the following:

+ Estimation of values will always be based on actual choices, so it can be considered as a relatively straightforward and uncontroversial method. If data are readily available, it can be relatively inexpensive.

+/- If the relationship between price and characteristics of the property is not linear, prices may vary considerably when characteristics only change marginally and vice versa.
The scope of environmental benefits that can be measured as limited.

It is relatively complex to implement and interpret; it requires a high degree of statistical expertise as any kind of market distortion must be considered and outside influences of the (housing) market have to be excluded.

Summary: Hedonic Pricing Method

| Data requirements: | A measure or index of the environmental amenity of interest; Data on property values, property and household characteristics for a well-defined market area (Cross-section and/or time period) reflecting the different levels of environmental quality or different distances to an environmental amenity (protected area = attractive natural territory for residential property). |
| Cost range*: | 3-9 man months for one experienced economist. 2-4 man months for assistance |
| Time frame*: | 3 to 12 months, depending on availability of data |
| Main fields of application: | Valuation of environmental benefits linked to housing property |
| Guidelines and recommendations: | Identify the appropriate model of regression analysis for the study; Figure out which kind of data is available and which is not; Exclude outside influences on the market values; Be aware of the limited scope of values which can be estimated. |

*average values

5.4.5 Short description of the Market Price Analysis Method

Market prices reflect private willingness to pay for protected area costs and benefits. They may be used to construct financial accounts to compare alternative protected area uses from the perspective of the individual or company concerned with private profit and losses acting at commercial markets. It can be used to value changes in quantity and quality of a good or service. The standard method for measuring the use value of resources traded on the market is estimation of both a consumer surplus and a producer surplus. The sum of consumer surplus and producer surplus is called the total net economic benefit or the economic surplus.

The different stages of implementation include:

Stage 1: Estimation of the market demand function in order to determine both the producer and the consumer surplus before the change in quantity or quality of a product happens. The consumer surplus constitutes the maximum amount which people are willing to pay for a good, minus what they currently pay, multiplied with the quantity paid at the actual price. The producer surplus represents the difference between the total revenues earned from a good, and the total variable costs of producing it.

Stage 2: Next, the market demand function as well as producer and consumer surplus have to be calculated after the change in question happens. The market price will increase after the quantity of the good was reduced. Similarly, the demand will drop also due to the limited offer of the product. This results in a new consumer surplus, which will be lower than before. In case of lower market prices, the offer will increase as well as the quantity purchased. The result may be a higher consumer surplus, depending on the difference in prices.

Stage 3: Difference between consumer surpluses – In order to calculate the loss in economic benefits to consumers, the original consumer surplus will be related to the new one by subtracting benefits after the change from benefits before the change.

Stage 4: Difference between producer surpluses – The same step has to take place for the producer surplus which compares the benefit (= revenues) out of the production of a good for the producers with the benefit after a reduction or increase of the quantity of the good (see above). It is calculated by subtracting the variable costs of production from the total revenues out of its sale.

Stage 5: Calculation of total economic losses or benefits – It is either the total sum of lost consumer surplus and lost producer surplus, or the total sum of gained consumer surplus and gained producer surplus.

The result of the analysis can be used to compare the benefits of actions that would allow to increase or decrease production to the costs of such actions.

The main advantages and disadvantages of the method are the following:

+ Data (which means prices) for carrying out the analysis are relatively easy to obtain and the calculation of
The method estimates the value of non-marketed resources or ecologic functions in terms of changes in economic activity by modelling the physical contribution of the resource(s) or function(s) to economic output (Task Force 1998: 39). In other words, the change in productivity (of humans) resulting from environmental deterioration or improvement can be quantified by applying the higher or lower productivity as monetary value. If a natural resource is a factor of production, it has to be considered that changes in the quantity or quality of the resource will result in changes in production costs, and/or productivity of other inputs.

Possible ecological functions to be valuated can be watershed protection, storage and recycling of organic matter, nutrients, human waste, climate regulation or (change of) land use patterns. The method also is known as net factor income, derived value or productivity losses method (Task Force 1998: 39).

5.3.6 Short description of the Productivity Function Method

The different stages of implementation include:

Stage 1: The first step is to specify the production function for the improved or deteriorated function. This is the functional relationship between the inputs – for example, the monetary values of water of a particular quality from a reservoir, of chemicals, and of filtration, and of the output – clean drinking water.

Stage 2: The second step is to estimate how the cost or benefit changes, when the main input parameter (relating to the function to be valuated) changes. Let’s take the example of drinking water - when the water quality in a reservoir changes, the level of purification has to be changed as well. For the production function, this means that the variables ‘quantity of purification chemicals and filters’ needed for different levels of water quality will change, depending on the level of water quality that is put into the production function. The quantities resulting from the production function for chemicals and filters would then be multiplied by their costs.

Stage 3: Estimation of economic benefits – the results of the study will show the benefits of protecting an environmental good by demonstrating the costs, if the ecologic function provided would not be available or only partially available. For example, if the runoff within the catchment area of a water reservoir does not contain nutrients and/or pesticides, the water will require only little treatment and the purification costs for drinking water will be minimal. If the emission into the reservoir is high, the cost of purifying water will be also high. The difference in purification costs constitutes the benefits of reducing or even eliminating polluted runoffs. The result can also be modified by calculating step by step measures for improvement or deterioration of an ecologic function. When calculating the values of an ecologic function or service, the exact beneficiary has to be identified, i.e., for a consumer the consumer surplus will increase, but for a producer the producer surplus will raise. It is also possible that both consumer and producer will profit from improved or constant environmental conditions.
The main advantages and disadvantages of the method are the following:

+ Data needs are limited, and the data may be available quite easily, i.e., the cost for the valuation study can be kept low.

+ The method represents a very direct approach to costs and benefits, thus reflecting an actual status of an ecologic function or service provided.

– As it uses only marketed goods of a ‘surrogate market’, its fields of application are limited. A direct consequence might be to underestimate the true value of an ecological function for neglecting all services which cannot be expressed by marketed goods.

± The method requires knowledge about scientific response relationships of actions that modify the quality or quantity of a resource.

<table>
<thead>
<tr>
<th>Summary:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data requirements:</td>
</tr>
<tr>
<td>Productivity Function Method</td>
</tr>
<tr>
<td>Cost range*: 2-5 man months for one experienced economist. 2 man months for assistance</td>
</tr>
<tr>
<td>Time frame*: 2-6 months</td>
</tr>
<tr>
<td>Main fields of application: Valuation of ecologic functions or services which have direct influence on final products or one or several factors of productivity.</td>
</tr>
<tr>
<td>Guidelines and recommendations: Clarify whether the ecologic function concerns consumer or producer surplus or both; Be aware of the fact that possibly not all relevant values can be expressed by the Productivity Function Method.</td>
</tr>
</tbody>
</table>

5.4.7 Short description of Cost-based Methods, including the Damage Cost Avoided Method and the Replacement/Recovery/Substitute Cost Method

The Damage Cost Avoided, Replacement/Recovery Cost, and Substitute Cost Methods are all related. They express values of ecosystem services estimating either the costs of avoiding damages by having the ecologic function available, the cost of replacing ecosystem services, or the cost of providing substitute services. The Replacement Cost and Substitute Cost Method can also be used to estimate non-use values. Yet, neither of the approaches assumes willingness to pay, but rather uses estimates of the value of ecosystems themselves or of services provided by them. Hence, the result may differ from other methods for non-use values, e.g., Contingent Valuation.

The obtained value, however, is at least as high as people seem willing to pay for avoiding damages to ecosystems or for replacing its services. The most popular cases for their application are soil erosion protection, water quality services (of wetlands) or storm protection services.

The different stages of implementation include:

Stage 1: Ecological assessment of the services provided by ecosystem – This assessment will analyse the actual and the expected status of protection or service by the ecosystem.

Stage 2: Estimation of economic costs for making the desired ecologic functions (= the benefit) available – this step depends on the specific method chosen. If using the ‘Damage Cost Avoided’ method, the information on the status of protection (e.g., against erosion or flooding) obtained in the first step is used to estimate in monetary values the potential damages to property if erosion or flooding were to occur. Another approach would be to determine whether nearby property owners have spent money to protect their property from the possibility of damage, for example, by purchasing additional insurance or by reinforcing their basements.

The total of these avoidance expenditures would then be counted for all affected properties and would provide an estimate of the benefits from increased protection. Presumably, both approaches will result in different estimates, but will have the same objective, to value the protection service offered by an ecosystem.

The Replacement Cost Method uses costs for providing artificial substitutes for ecologic functions or services. It is easier to estimate the costs of producing benefits than of the benefit itself. For example, if a wall has to be built in order to protect a coastal area from storm and flooding, the cost for building and maintaining the wall will represent the benefit of having a coastal wetland instead. This approach does not yet consider whether people will accept building such a protective wall.
Stage 3: Decision making on protecting or replacing – The cost of restoring a protected area is used as an estimate of the cost of environmental damage to the protected area. These costs are then compared to the costs of preventing the damage in the first place. If the replacement costs exceed the prevention costs then the damage should be avoided.

The main advantages and disadvantages of the method can be described as follows:

+ The method can be easily followed and understood, which increases the acceptance of its results. For example, if there is a close relation between the ecological performance and the value of it for the society, the information serving as a basis for future decisions is transparent and can be communicated rather easily to the public.

+/- The cost-based methods assume that expenditures to repair damages or to replace ecosystem services are valid measures of the benefits provided. However, costs are usually not an accurate measure of benefits. Therefore, in some cases they may only be a rough indicator of economic values.

- The goods or services being replaced probably represent only a part of the full range of services provided by the natural resource, thus, the benefits of an action to protect or restore the ecological resource would be understated. Also, a few environmental resources have really direct or indirect substitutes. Substitute goods, however, are unlikely to provide exactly the same types of benefits as the natural resource.

- It does not consider social preferences for ecosystem services, or individuals’ behaviour in the absence of those services.

<table>
<thead>
<tr>
<th>Summary:</th>
<th>“Cost-based” Methods (Damage Cost Avoided, Replacement/Recovery/Substitute Cost Method)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data requirements:</td>
<td>Information on the ecological performance to be valuated; Information on costs for avoiding damage to or replacing the ecological function.</td>
</tr>
<tr>
<td>Cost range*:</td>
<td>2-6 man months for one experienced economist. 2 man months for assistance</td>
</tr>
<tr>
<td>Time frame*:</td>
<td>2-6 months</td>
</tr>
<tr>
<td>Main fields of application:</td>
<td>Valuation of ecosystem functions or services.</td>
</tr>
<tr>
<td>Guidelines and recommendations:</td>
<td>Clarify the relationship between ecological function/service and its substitute; Be aware of the fact that possibly not all relevant values can be expressed by cost-based methods.</td>
</tr>
</tbody>
</table>

5.4.8 Short description of the Money Generation Model

The Money Generation Model is an economic model that can be used to estimate economic benefits of nature or national parks for local economies. The original Money Generation Model focused primarily on the economic benefits associated with park tourism expenditures from non-local tourists. It was subsequently expanded to include the economic effects expenditures by the state administration salaries (National Park Service), park construction projects, and other park-related activities. It also included expenditures by other outside parties such as state spending for park access roads or investments made by outside interests for park-related tourism infrastructure.

The method applies the following economic impact equation:

Economic impacts = Number of visitors * Average spending per visitor * Economic multipliers

The different stages of implementation include (for detailed description see chapter 6.3):

Stage 1: Definition of the study area – which means to determine for which municipalities the economic effects will be calculated.

Stage 2: Collection and classification of tourist data – this includes an estimation of the total number of both day and overnight tourists, and of the share of tourists that visit the region mainly because of the protected area. Tourists have to be classified into different groups depending on the duration of their stay.

Stage 3: Estimation of the average daily spending per tourist.

Stage 4: Estimation of a regional multiplier factor for tourist expenditures.

Stage 5: Calculating the total figure of economic benefits by multiplying (a) the total annual number of tourists who are coming because of the conservation status, (b) the average daily expenditures, and (c) the multiplier factor.
The main advantages and disadvantages of the method are the following:

+ The method offers a simple approach to capturing some of the values of a protected area, for site-specific, local audience situations.

+/- It may not provide much useful or appropriate information for a Ministry of Finance deciding how much national funding to allocate to the protected area. Indeed, national government expenditure on the protected area is measured as a benefit in the Money Generation Model rather than as a cost.

- It can be problematic to identify which expenditures really protected-area related and which expenditures would occur anyway, independent of the protected area.

Summary: Money Generation Model

<table>
<thead>
<tr>
<th>Data requirements:</th>
<th>Data on number and intention of tourists; Visitor spending in the region; Public expenditure related to park/protected area (including wages and purchase of goods and services from local suppliers).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost range*:</td>
<td>3-5 man months for one experienced economist. 3 man months for assistance</td>
</tr>
<tr>
<td>Time frame*:</td>
<td>3-6 months</td>
</tr>
<tr>
<td>Main fields of application:</td>
<td>Valuation of economic benefits of protected areas for the local or regional economy.</td>
</tr>
<tr>
<td>Guidelines and recommendations:</td>
<td>Determine the relevant types of expenditure (only non-local tourists and without public park related expenditure); Thoroughly select the economic multipliers.</td>
</tr>
</tbody>
</table>

*average values

6 Detailed description of important methods

6.1 Contingent Valuation Method

6.1.1 What is Contingent Valuation and when is it useful?

The term “contingent” means “hypothetical”. Contingent Valuation is an economic evaluation method that works with hypothetical markets.

It has already been explained in the chapter on cost-benefit-analyses that many environmental goods are typical examples of public goods because they are non-exclusive and non-rival in consumption. Such goods cannot be traded in commercial markets and hence have no monetary value. This where Contingent Valuation in needed as it relies on establishing a hypothetical market. Basically, a sample of people is asked how much they would be willing to pay for a particular good, assuming there was a market for it. Depending on the situation the respondents can also be asked how much they would be willing to accept in case the good or commodity was taken away from them (Hanley and Spash 1994: 53).

Contingent Valuation is a survey-based method. A sample of persons is asked to quantify their individual preferences for a certain good in monetary terms. Normally, these preferences would not be spelled out quantitatively because there is neither a need nor an opportunity to do so (Dixon and Sherman 1990: 203).

Obviously, Contingent Valuation offers a great potential for assigning a monetary value to Natura 2000 sites that are not related to any use, i.e., mainly existence value and bequest value, but also option value and quasi-option value. Nevertheless, Contingent Valuation can easily be misused to manipulate the results of a cost-benefit analysis because much depends on how the hypothetical market is designed, and how the questions are formulated.

In the following sections Contingent Valuation is introduced step-by-step. The potential biases and shortcomings of the method are also described. Again, it has to be said that this manual is not supposed to be a textbook for students of economy. Instead, the intention is to enable conservationists to become competent partners of those economists who carry out the analysis. However, all sources of information are quoted, and those who wish to find more details can refer to the bibliography.

6.1.2 “Willingness to pay” or “willingness to accept”?

Usually, Contingent Valuation is associated with willingness to pay. However, just like on a real market, people can also be asked how much they would like to get, depending on whether they are selling or buying a good
or service. In the case of Contingent Valuation, this would be willingness to accept (Barbier et al. 1997: 98).

The main question to decide on when choosing one of the two concepts is whether the respondents are receiving a benefit for which they would pay; suffering a loss which they would only accept if they received money in return.

This can be exemplified with regard to a Natura 2000 site in the countryside. Somebody who lives in the city and visits the site on weekends for recreation might receive a benefit when the natural values of the area are conserved. They might be willing to pay for the designation of a Natura 2000 site. In contrast, a land-owner who is confronted with restrictions for the future use of his land because of the Natura 2000 status suffers a certain loss, which he would only accept if he got compensated with money. Therefore, it would be appropriate to ask the urban resident how much he is willing to pay and to ask the land-owner how much he is willing to get in order to accept the measure.

The choice between willingness to pay and willingness to accept formats also has a normative dimension. Do you presume that the individual has a right to the situation before or after the change? The choice therefore depends on a value judgement as to which perspective or which system of property rights is more equitable (Hanley and Spash 1994: 33).

In practice, willingness to accept formats give a high number of protest bids. A stated willingness to pay tends to be significantly lower than a stated willingness to accept. Willingness to accept is usually higher than willingness to pay because:

- individuals value a given reduction in entitlements more highly than an equivalent increase of entitlements;
- individual income constrains willingness to pay bids whereas willingness to accept bids are unconstrained;
- some people are unwilling, on ethical grounds, to accept monetary compensation for the loss of an environmental benefit and state a ridiculously large amount (Hanley and Spash 1994: 63 f.).

Therefore, in most situations willingness to pay measures should be used, with the understanding that they probably underestimate willingness to accept amounts.

6.1.1 Stages of a Contingent Valuation

A Contingent Valuation study typically has six stages (see fig. 11). Some authors mention the critical assessment of the results as the sixth stage. However, this step is generic to all economic evaluation methods and has already been discussed above (Arrow et al. 1993: 32; Hanley and Spash 1994: 54-57; Pearce and Moran 1994: 28).

Stage 1 - setting up the hypothetical market and designing the questionnaire. As means of communication with the respondents, a questionnaire has to be elaborated. Before asking people for their willingness to pay or their willingness to accept, there should be a first section in the questionnaire with information on the object of evaluation and the conditions under which the hypothetical market will function. In order to design a payment scenario, the project to be paid for has to be described in such a detail that respondents can understand the net benefits. It is very important to give all information the respondents need to understand the issue and give a sound answer, but to avoid any kind of manipulation. A survey for a Contingent Valuation of a Natura 2000 related project could for instances work with maps of the relevant site(s), with photos, and verbal descriptions of the area and of the project to be carried out (Hanley and Spash 1994: 54; Pearce and Moran 1994: 28; Spash et al. without year: 101).

The first section of the questionnaire should describe the bid vehicle and whether all consumers will pay a fee if the change goes ahead, and how this fee will be set. The term “bid vehicle” refers to the payment scenario, i.e., the way funds will be raised in the hypothetical market, for instances through taxes or entrance fees. The overall aim must be a realistic, though hypothetical, proposal (Spash et al. without year: 102).
In the second section of a Contingent Valuation questionnaire, the interviewees are asked for their willingness to pay and/or to accept. There are different possible ways in which respondents can indicate their choice or preference. The most common question formats are:

- **Discrete or dichotomous choice questions.** Such questions relate to whether or not the respondents would want to “purchase” or “sell” the change in welfare if it cost a specified amount.
- **Continuous or open-ended questions.** These are direct questions about the maximum amount the respondents would be willing to pay or wanting to accept for a certain change in welfare. This format can also be designed as a bidding game.
- **Payment cards.** When this format is used, respondents are shown a list of possible answers and asked to indicate their choice. It requires a careful determination of the range of possible answers. This means that one has to consider carefully the starting point and the end point of the range of possible answers.

The questionnaire should also ask in a third section for a collection of socio-economic data that later allows to calculate a population statistics and to analyse bid curves (see below). These questions should cover gender, age, education, and income.

Finally, a fourth section of the questionnaires can be directed at interviewers. They should be asked to give feedback on interviews, for example, whether others had been listening while the survey was conducted. The interviewers can also be asked to rank the difficulty the respondents had in answering each previous section of questions (Spash et al. without year: 104).

In total, a Contingent Valuation questionnaire should include four sections - framing and background information, willingness to pay and/or to accept, socio-economic data, and interviewer response, respectively (Spash et al. without year, 103 f.).

### Stage 2 - undertaking a pre-test and redesigning the survey

Once the questionnaire has been elaborated, a pre-test should be conducted. By applying the questionnaire to a few test persons, it will soon become evident how clear the hypothetical market has been described and where there is a risk of misunderstandings.

The pre-test can also be a learning experience for the survey coordinators who are responsible for training the interviewers. Depending on the outcome of the pre-test, the coordinators can revise the method of training and improve the selection procedure for interviewers. In countries where experienced market research companies are available, selection and training by domestic coordinators is less important (Spash et al. without year: 105).

### Stage 3 - drawing a sample and obtaining bids

Stage 3 - drawing a sample and obtaining bids. First the basic population whose preferences are to be studied has to be defined. If this main unit is relatively small, a complete survey can be attempted. In this case all individuals from the basic population would be addressed. Usually, it makes more sense to assume a larger main unit, for example, the population of a region or even the entire nation. The definition of the basic population depends on the decision-making problem, and the related information needs from which the Contingent Valuation study has been derived.

Depending on the financial resources of those who carry out the study, it will usually not be possible to have interviews with more than a few dozen or hundreds of respondents. Therefore, a representative sample has to be drawn. A sample is representative if the distribution of sexes, age, income, education, regions, and other features is similar to the entire population.

A sample is representative if the distribution of sexes, age, income, education, regions, and other features is similar to the entire population.

It is important to be aware that sampling is one of the crucial influencing factors of the entire evaluation study, in the words, of the NOAA panel. “Probability sampling is essential for a survey […] The choice of sample specific design and size is a difficult, technical question that requires the guidance of a professional sampling statistician.” (Arrow et al. 1993: 46)

The survey as such can either be administered through face-to-face interviewing, telephone interviewing or via mail. Face-to-face interviews offer the most scope for detailed questions and answers, but can lead to an interviewer bias.

### Stage 4 - estimating bid curves

Stage 4 - estimating bid curves. First, both mean and median willingness to pay and/or willingness to accept ought to be calculated. “Protest bids” and outliers should be omitted by the rule of thumb, but according to standardized rules. “Protest bids” are zero bids for other reasons than a zero value being placed on the resource in question. Whether a bid is a “protest bid” or not can be decided easier upon if additional questions relating to the social status and income of the interviewees are included in the questionnaire. Outliers are interviewees who have made very large bids which are not compatible with their income situation (Hanley and Spash 1994: 55 f.; Spash et al. without year: 104).

In a bid curve, willingness to pay or willingness to accept are used as the dependent variable against a range of independent variables.
In a bid curve, willingness to pay or willingness to accept are used as the dependent variable against a range of independent variables like income, education, age or environmental quality being bid for. This is a kind of regression analysis which results in different bid curves which show for example the level of willingness to pay of the respondents in dependence from their income. This type of information is important in case the sample of interviewees is not quite representative of the total population. It can also be used for assessing the validity of the study and to predict the valuation of other objects than those suggested in the actual study (Hanley and Spash 1994: 55 f.).

Stage 5 - aggregating data. Most Contingent Valuation studies are based on surveys in which only a relatively small sample of people is interviewed. However, the underlying intention is to interpolate from the sample results to the total population. This is meant by the term “aggregation”.

Basically, there are two ways of aggregating the results. The first one implies multiplying the mean or median value from the sample by the total population number. In case the sample turned out to be not representative of the total population, the bid curve can be used to do a stratified multiplication, e.g., by income groups or age classes.

Stage 6 – reporting. Every report of a Contingent Valuation study should specify the definition of the population sampled, the sampling frame used, the sample size, the overall sample non-response rate and its components (e.g., refusals), and item non-response on all important questions. The report should also include the exact wording and sequence of the questionnaire and of other communications to respondents (e.g., advance letters, maps showing the location of Natura 2000 sites to be valued). All data from the study should be archived and made available to interested parties. Most Contingent Valuation studies do not meet these requirements although they can help increasing the credibility of the outcome (Arrow et al. 1993: 31).

6.1.4 Problem areas associated with Contingent Valuation

The Contingent Valuation method has also received criticism that range from fundamental doubts about the alleged inconsistency of the method with the assumptions of rational choice, to problems related to the absence of a meaningful budget constraint (Arrow 1993: 6-18).

When implementing a Contingent Valuation study, one has to be aware of the pitfalls of this method. There are various factors that can lead to biased results. The most important of them can be summarized with the following headings explained below:

- strategic biases;
- design biases;
- mental account biases;
- aggregation biases.

Strategic biases. Asked about their willingness to pay, respondents might understated their bids because they believe that bids will be collected and because environmental goods are typically non-excludable (free-rider problem). As this is a form of strategy, the resulting bias is called strategic bias. It can be solved by stressing the hypothetical nature of the exercise and urging the respondents to provide a true value, if they are able to formulate one. The interviewees can also apply an opposite strategy if they believe that their bids are purely hypothetical. In this case, they may overstate their willingness to pay for an environmental benefit as this increases the probability of the improvement going ahead. Such behaviour can be reduced by suggesting that the survey results may indeed influence policy and that they are therefore not purely hypothetical and might be collected in order to provide the particular environmental gain.

This leads to the conclusion that drafting the first section of a Contingent Valuation questionnaire is a tightrope walk between putting too much and putting too little emphasis on the hypothetical nature of the bidding question. Thus, the strategic bias is linked to the various forms of design biases (Hanley and Spash 1994: 58 f.).

Design biases. The survey design includes the way information is presented to individuals, the order in which it is presented, the question format and the amount and type of information presented. It can affect responses. For example, the starting point given to respondents can influence the final bid tendered – either because of impatience on the part of respondents or because the starting point suggests what size of bid is appropriate. This is likely when respondents have no experience of trading with the resource in question. Payment card mechanisms are subject to a similar form of bias known as anchoring bias. Researchers also found that bids from respondents to preserve different animal species varied significantly depending on the information they were provided with. Should uniformed respondents be informed, and how does this process affect their eventual responses to CV questions? If there is no information provision, should the responses of uniformed respondents count, and what does this imply for the range of subjects suitable for CV studies? Information which improves the knowledge of an individual concerning the characteristics of a

---

2 This type of biases is also known as “hypothetic market error” (Hanley and Spash 1994: 51 f.).
good can be regarded as informing a consumption decision, whereas information which alters the preferences could be regarded as creating a bias. As a general rule, respondents must understand what it is that they are asked to value and must accept the scenario in formulating their responses. Frequently there are limits on the ability of interviewees to internalize and accept the information given. If, for instance, respondents rely on a set of heuristics ("these nature conservation sites are seldom as effective as we’re led to believe", or "authorities do not control these areas as carefully as they are supposed to"), in effect they will be answering a different question from that being asked (Arrow et al. 1993: 14-16; Hanley and Spash 1994: 60 f.; Pearce and Moran 1994: 30 f.).

Mental account bias. Individuals dispose only of a limited amount of income, wealth and time to allocate to all causes, public and private. This fixed total has to be spent across all environmental assets of interest and all environmental services to be consumed. At the extreme, it can happen in a Contingent Valuation estimate of the mean value of a single asset that respondents allocate their entire environmental budget to this single asset. This is related to the so-called embedding problem, i.e., respondents may interpret the hypothetical offers of a specific good or service to be indicative of an offer for a broader set of similar goods and services. The value of the good being sought is embedded in the value of the more encompassing set of goods or services reported by the respondent. In responding to questionnaires, individuals may not consider the limits to, and other demands upon, their relevant mental account. To avoid this bias, the interviewees should be asked what current or planned expenditures they would forgo to pay for the particular project. If respondents are reminded convincingly of the very real economic constraints within which spending decisions must be made, they might re-evaluate their responses and revise them downward (Arrow et al. 1993: 14; Hanley and Spash 1994: 61; Pearce and Moran 1994: 29 f.).

Aggregation bias. Analysts will often wish to summarize respondents’ answers to valuation questions in terms of the mean willingness to pay for the good or service, or develop an aggregate benefit estimate for a total population which is larger than the sample of interviewees (see above, stages 4 and 5 of a Contingent Valuation). Two types of problems here are sampling errors, meaning that the composition of the sample is not representative, and insufficient sample size (Pearce and Moran 1994: 30).

### 6.1.5 Examples of results of Contingent Valuation studies

The following table gives some examples of results of recent Contingent Valuations that have been carried out in Germany and Austria (see fig. 12).

<table>
<thead>
<tr>
<th>Object of valuation</th>
<th>Methodological details</th>
<th>Valuation result</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Willingness to pay for a conservation programme for beavers in a particular German region (Spessart, Hessen)</td>
<td>350 oral interviews with visitors of the protected area (337 of which could be analysed)</td>
<td>€ 0.7 / day / visitor (€ 1.0 without protest bids)</td>
<td>I. Bräuer, taken from Elsasser and Meyerhoff 2001, 296</td>
</tr>
<tr>
<td>Willingness to pay for the continuation of a sheep grazing project in the valley of the Bavarian river Altmühl</td>
<td>307 oral interviews with overnight visitors (282 of which could be analysed)</td>
<td>€ 1.1 / day / visitor</td>
<td>Degenhardt and Gronemann 1998</td>
</tr>
<tr>
<td>Willingness to pay for the establishment of a National Park Kalkalpen (&quot;lime Alps&quot;), Austria</td>
<td>Oral interviews with a representative population sample of 1,410 persons (both inhabitants and visitors)</td>
<td>Different results, depending on question format</td>
<td>F. Hackl and G.J. Pruckner, taken from Elsasser and Meyerhoff 2001, 301</td>
</tr>
<tr>
<td>Use values and non-use values</td>
<td>10 % deniers</td>
<td>WTP of € 7.5 / regional inhabitant household / year based on payment card</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Payment cards and closed questions in referendum format (close-ended double-bounded)</td>
<td>WTP of € 8.9-25.7 / regional inhabitant household / year based on closed question</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bid vehicle: earmarked payment to national park fund</td>
<td>WTP of ATS 7.5-10.5 / visitor household / year based on closed question</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Additional questions regarding education, income, etc.</td>
<td>WTP of ATS 5.7 / visitor household / year (for non-use values)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Independent variables: Income, age, education, and membership in conservation club</td>
<td></td>
</tr>
</tbody>
</table>
6.2 Travel Cost Method

6.2.1 What is the Travel Cost Method and when is it useful?

The Travel Cost Method (TCM) is the oldest of the indirect non-market valuation techniques. It was developed in 1947 by the economist H. Hotelling, and formally introduced to the literature by other economists in 1958 (Wood, Trice) and 1966 (Clawson, Kretsch). The main field of application lies in modelling outdoor recreation (eco-tourism, fishing, hunting, boating, and forest visits). It can also be used to value the benefits of forests for fuel-wood or to value water supply facilities (representing also direct use of an area). The objective of the TCM is to place a value on non-market environmental goods by using consumption behaviour in related markets. It means that the costs of consuming the services of the environmental resource are used as a proxy for the market price. These consumption costs include travel costs, entry fees, on-site expenditures, and outlay on capital equipment necessary for consumption. (Hanley and Spash 1994: 83 ff.; Löwenstein 1994: 68 ff.; Pearce and Moran 1994: 35 ff.).

Only recreational resources which require significant expenditure for their enjoyment can have user values estimated. If a site charges no entry fees, the travel expenditure therefore is taken as surrogate market and it is observed how changes in travel expenditure will influence peoples’ willingness to visit the site. This includes also the possibility to value changes in the environmental quality of a site. Theoretically, it is assumed that there is a weak complementarity between the environmental asset and consumption expenditure. Namely, if the consumption expenditure is zero, the marginal utility of the public good is also zero. For instance, if travelling to a protected area becomes so expensive that nobody travels there any more, the marginal social cost of a decrease in the quality of that protected area is also zero (Hanley and Spash 1994: 83). Moreover, it is assumed that the representative visitor’s utility function can be separated in the recreation activity being modelled. If the activity of interest is hiking, the utility function is estimated independently for the demand of hiking trips, and not considering alternative leisure activities.

Travel cost models are often applied for the valuation of particular sites, it can, however, also be used for groups of sites.

6.2.2 Basic elements of the Travel Cost Method

For the preparatory definition of the Travel Cost model, there are two approaches for how to mathematically ‘build’ the trip generating function (TGF) for the valuation study (Hanley and Spash 1994: 84):

- It can be applied for valuation of travel costs for individuals. The variables to be considered are distance from the site, cost per mile of travelling, time for travel, value of the travel time, and type of the trip (holiday, day-trip, etc).

\[ C_{ij} = C(DC_{ij} + TC_{ij} + F) \]

\( i = 1 \ldots n, j = 1 \ldots m \)

\( C = \) travel costs for each individual “i” to site “j”
\( DC = \) distance costs for each individual “i” to site “j”
\( TC = \) time costs for each individual “i” to site “j”
\( F = \) entrance fee to the site “j”

- The second possibility is a zonal valuation of travel costs. This approach requires dividing the area surrounding the site to be valued into zones of origin. In most cases the zones of origin are built according to administrative structures (counties, states), as for these structures it is easier to get correspondent population data. The zones of origin may, however, also be concentric rings around a site. The number of zones can vary from very low to very high numbers (e.g., 3-50). The variables to be considered in that case are population of the different zones, and travel costs.

\[ V_{zj} = V(C_z + Pop_z S_z) \]

\( z = 1 \ldots Z, j = 1 \ldots m \)

\( V = \) visits from zone “z” to site “j”
\( C = \) travel costs from zone “z” to site “j”
\( Pop = \) population of zone “z”
\( S_z = \) socio-economic variables for each zone

(Hanley and Spash 2004: 84)

For both possibilities it is necessary to incorporate socio-economic variables such as average income per zone, race, sex, education, age as one variable of the equation. The dependent variable in both cases is expressed either in number of trips per capita or in number of trips per annum.

The mathematical basis for a TGF are multiple regressions. After having determined the trip generating function, a demand relationship is estimated by simulating what would happen to visits per annum (individual TCM) or visits from each zone (zonal TCM) when the hypothetical fee is increased. The result is a demand
The key assumption behind the demand curve is that as the travel costs decrease, the particular site becomes more attractive to potential visitors. On average, it biases the Travel Cost results upwards. For this reason, several authors (see Smith and Kaoru 1990) have argued that the fact of having several interesting sites not far away from the site of the study, makes the travel costs of visiting substitute sites (which means having the choice between many comparable sites at different distances) should always be included in the TGF. It can be assumed (see Smith and Kaoru 1990) that the fact of having several interesting sites not far away from the site of the study, makes the particular site more attractive to potential visitors. On average, it biases the Travel Cost results upwards. For this specific case, the appropriate statistical method has to be applied (Pearce and Moran 1994: 37).

6.2.1 Problem areas associated with TCM

The Travel Cost approach implies several problem areas which can heavily bias the results of a study (Pearce and Moran 1994: 35 f.; Hanley and Spash 1994: 86 f.).

- Multi-purpose trips;
- Holiday makers versus residents;
- Calculation of distance costs and value of time;
- Choice of dependent variables;
- Statistical problems (including truncation bias).

Multi-purpose trips. Travellers often do not have the single purpose to visit a certain site, but are making a longer journey during which different sites of similar quality are visited. For those tourists part of the Travel Cost to the particular site should be excluded from the minimum value they are paying for the visit. In practice, two options have developed how to deal with this problem:

- Option 1: to ask people to score the importance of a visit to the relative to the enjoyment of their entire journey;
- Option 2: multi-purpose travellers are excluded from the TC valuation study, and instead a per visit consumers' surplus figure based on these functions may be elaborated, and then aggregated to all visitors. This basically assumes that multi-purpose travellers, on average, value the site as high as purposeful visitors.

Holiday makers versus residents. If a person decides to move near a highly appreciated site, which the person has visited often beforehand, his future travel costs will be low. Thus, his/her valuation of a site will be underestimated. Holiday makers travel from their temporary accommodation place to the site in question. For the valuation study, only these travel costs might be considered, which then assumes that their average valuation of the site is the same as for day-tourists (which will probably bias the total value figure downwards). Another way is to assume that they came to that country because the type of protected area or site is typical for it. In that case part of the travel costs from their home residence to the foreign country should be integrated in the valuation of their spending.

Calculation of distance costs. The pre-condition for setting ‘distance costs’ a variable in the TGF is that a price per kilometre is set. For doing this, two options exist, i.e., (1) use petrol costs only or (2) use full costs of motoring, including insurance, allowance for depreciation, etc. “Individuals, in maximizing utility, are assumed to compare the marginal utility with the marginal costs of consumption; this makes option (1) more attractive, since option (2) is a measure of average costs.” (Hanley and Spash 1993: 88).

Value of time. The main inputs for recreation flows are visits, equipment, and time. Time can be divided in time for travelling to a site and recreation time at the site. As time normally is scarce, it has an implicit (shadow) price. In literature, many reflections and proposals for how to calculate the price of time can be found. The most appropriate options are described below.

As most recreation time is spent at the expense of another recreation possibility (instead of working hours), the opportunity cost will be measured with reference to the value of other recreation activities not possible at the same time. As the spending of recreation time is very individual, it is not possible to valuate every single recreation activity per person. Therefore, researchers have looked for a uniform proxy value. They suggested applying a value equivalent to one-third of the hourly wage rate, which proved to be of not very much evidence (Cesario 1976 in: Hanley and Spash 1994: 89). The most valid assumption is that on-site time has a positive utility for the visitor, whereas travel time may have a positive or a negative utility. The concrete values have to be determined by individual case. Exclusion of time will generate a flatter demand curve and bias the benefits downwards (Pearce and Moran 1994: 36). Up to now, a true solution to that question has not been developed yet.

Choice of dependent variable. The first variable represents visits from a certain zone, and the second variable is visits made by a certain individual. Option no. 1 is mostly expressed as visits per capita; option no. 2 is normally gathered by collecting data on visits per annum for each person. A theoretical recommendation on preferred option does not exist. Several authors (see Hanley and Spash 1994: 87) claim that data on visits per capita may not be consistent with consumer theory. However, data on visits per annum may contain some recall error, particularly in “informal recreation settings”; but are more suitable for fishing and hunting trips. If both
dependent variables are applied within the same valuation study, results have shown to differ considerably.

The second problem concerns the estimation technique. Pearce and Moran (1994: 37) recommend using discrete choice models of behaviour, which also consider the probability that a site will be visited due to its attributes compared to attributes of other sites.

Statistical problems. With regard to the dependent variables \( C_i \) or \( V_{zj} \) of the individual and the zonal model, there are two statistical problems, i.e., both variables can be censored as well as truncated.

Truncated means that only visitors to a site, in a defined sampling period, are contributing to the results of the TC study; there is no information on non-visitors. Therefore, no information on the determinants of the decision to visit the site is available. Additionally, other periods of time outside the sampling period, which normally will cover the main season, are not taken into consideration.

Censored means that less than one visit cannot possibly be observed. The consequence is that the dependent variable (visits) is censored at one, and that Ordinary Least Squares (OLS) estimates of demand parameters will be biased (Smith and Desvouges 1986 in Hanley and Spash 1994). As a solution, the same authors propose to use a Maximum Likelihood (ML) estimator instead of OLS. The result of the valuation model will vary in a way that OLS gives larger consumer surplus estimates than ML.

Another point is that the functional form of the TGF influences considerably the consumers’ surplus estimates resulting from the valuation study. The economic theory is unclear as to which function delivers the closest results to reality; the most popular functions are linear, quadratic, semi-log, and log-log. These four possibilities are illustrated below, showing also how different the results can be depending on the function selected.

### Fig. 12: Influence of TCM functional form on consumers’ surplus

<table>
<thead>
<tr>
<th>Functional form</th>
<th>Consumers’ surplus (1988 £/visit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quadratic</td>
<td>( \frac{V}{P} = a - b \cdot TC + g \cdot TC^2 )</td>
</tr>
<tr>
<td>Semi-log (independent)</td>
<td>( \frac{V}{P} = a - b \cdot \ln(TC) )</td>
</tr>
<tr>
<td>Semi-log (dependent)</td>
<td>( \ln(\frac{V}{P}) = a - b \cdot TC )</td>
</tr>
<tr>
<td>Log-log</td>
<td>( \ln(\frac{V}{P}) = a - b \cdot (\ln TC) )</td>
</tr>
</tbody>
</table>

*(Hanley and Spash 1994: 92)*

“In practice the choice of functional form needs to be determined empirically on an individual study basis. However, a number of studies have found that the visitation rate equation is best estimated using a semi-log form […]”(Pearce and Moran 1994: 36).

### 6.2.1 Conclusions on the application of the Travel Cost Method

The application of the Travel Cost Method is limited with regard to values (only use values) and with regard to benefits (recreational benefits of protected areas/activities or direct use values like fuelwood). The approach has several weak points (see 6.2.3), which can be minimized by an exact definition of the project. The TCM has been continuously applied and improved during the last few decades, with regard to both theoretical and empirical point of view, which increases its liability. However, uncertainties remain, which require skilled economists to achieve credible results. The application of the method may additionally be limited due to the large data requirements, which make the method rather expensive.

With regard to the problem areas described above, it can be concluded that the method is most suitable when a single site is to be valued, leaving its characteristics and those of other sites unchanged.

### 6.2.2 Examples of results of Travel Cost Valuations

The following table gives some examples of results of recent Travel Cost Valuations, which have been carried out in Germany and other countries.

### Fig. 13: Examples of results of recent Travel Cost Valuations

<table>
<thead>
<tr>
<th>Object of valuation</th>
<th>Valuation result</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adelaide beaches, South Australia</td>
<td>4.2 million beach visits = $ 15.4 - $ 21.1 million per annum capital value: between $ 200 and $ 300 million</td>
<td>Lothian, Andrew (2001): Environmental Valuation – Concepts, Techniques and Applications in SA</td>
</tr>
<tr>
<td>Danube flood plains, Germany, Austria, Hungary, Slovakia</td>
<td>€ 47.8 million</td>
<td>Gren et al. (1995): Economic Values of Danube Floodplains</td>
</tr>
</tbody>
</table>
6.3 Input-output analyses for measuring the economic effects of protected areas on tourism - combining the Money Generation Model with survey-based approaches

Tourism can be a kind of direct use of protected areas, depending on the conservation status. Thus the economic effects of such tourism are part of the direct use values of a protected area.

From a methodological perspective, techniques that measure the effects of certain types of spending (e.g., tourism) on regional economies are called input-output analyses. This is a generic economic approach that measures the monetary input into a national or regional economy, and how much of it leaves the country or region as monetary output in the subsequent cycles of spending and re-spending. Some economists have already conducted regional input-output analyses for Natura 2000 sites, for example Getzner et al. (2002) for some Austrian sites.

Input-output analyses can easily become very complicated. However, there is an American quantification approach which represents a kind of simplified input-output analyses and which might be sufficient for many purposes. It will be presented in the next section.

While it is relatively straightforward to calculate the economic effects of tourism in a local or regional economy, it is usually rather difficult to tell to what extent these effects are caused by conservation efforts. This is the point where survey-based approaches come into play. They allow eliciting the importance of protected areas and natural qualities for tourists in choosing their travel destination. That is why another section is dedicated to such survey-based approaches.

6.3.1 Money Generation Model

The US National Park Service has developed a very simple model to estimate the economic benefits to the local communities resulting from expenditures by park visitors who live outside the local area (non-local tourists). This approach has been dubbed “Money Generation Model”. It uses protected area-related expenditures (“sales”) from non-local tourists to determine the neighbouring communities’ benefits in terms of jobs and tax revenues. It is very much tailored to the American situation where local communities receive a share of sales-related taxes. In the US, it is relatively easy to calculate the number of visitors to a national park or a similar protected area because there often is only one access road where visitors have to buy entrance tickets. The share of visitors from adjacent communities can easily be determined. The number of non-local visitors gets simply multiplied by the average amount of daily tourist spending. Finally, an indirect and induced sales multiplier is applied in order to calculate the total sales benefits (see fig. 14) (Briceland 1991 [without page numbers]).

Indirect and induced sales multipliers (usually 1.2-2.8 for the US) vary with the structure of the local economy. Generally speaking, multiplier factors reflect the total impact of an initial expenditure in an economy. They indicate the additional economic activity generated as the recipients of an expenditure use it in turn to buy other goods and services (Briceland 1991 [without page numbers]).

When using the Money Generation Model as described above, the assumption is made that everybody who visits a protected area is coming because of the conservation status. This might be accurate in most US cases, for instance, the Yellowstone National Park where the land has been converted into a protected area at a very early stage. But in many European cases an area has already been a well established tourist destination before it became a protected area. This applies for example to most national parks in the Alps or on the North Sea Coast. In these cases one has to find out how many people are visiting the area additionally just because it has been designated as a protected area and how much these visitors are spending in the region.

6.3.2 Surveys for identifying the amount of tourist spending that has been induced by the conservation status of a protected area

For several German national parks the researchers have tried to identify the economic effects of tourism that...
has been induced by the conservation status of a protected area (e.g., Job et al. 2003). Basically, they applied seven steps:

- Defining the study area - for which communities the economic effects should be calculated.
- Estimating the total number of both day and overnight tourists in the study area per year. Basis - visitor counts of the protected area administration or statistics of the local tourism board.
- Estimating the share of tourists that do visit the region mainly because of the protected area. Basis - surveys among tourists.
- Classifying tourists into different groups, e.g., day visitors, tourists staying in hotels, tourists staying in B&B’s and campers (alternatively, day visitors, short-term visitors and long-term visitors).
- Estimating the amount and the place (inside or outside the study area) of daily expenditures of the different groups of visitors. Basis - surveys among tourists.
- Estimating a regional multiplier factor for tourist expenditures. Basis - Sheer guessing or survey among service providers (hoteliers, restaurant, shop owners, etc.).
- Calculating the total figure by multiplying (a) the total annual number of tourists who are coming because of the conservation status, (b) the average daily expenditures, and (c) the multiplier factor.

This shows that the most important element of such an analysis is a representative survey either among all the tourists visiting the study area or only among those tourists visiting the protected area. In the survey, visitors have to be asked (a) for what reasons they came, and what role the protected area played in choosing this specific destination, (b) how long they are staying, and to which group of tourist they belong (hotel, B&B, camping, etc.), (c) how much on average they are spending per day, and (d) where they are spending their money – inside or outside the study area. In addition to that a survey among service providers and suppliers can be carried out in order to get a clearer picture of the regional multiplier factor.

Please note:
- To be representative and valid, such an analysis requires a minimum sample size of about 1,000 respondents.
- Such an analysis can be combined with the Travel Cost Method because people can be asked where they come from and how far they have travelled.

### 6.3.4 Examples from Germany

**First example:** the Bavarian Forest National Park, Germany (Kleinhenz et al. 1982, 10-15):

- Surveys among 850 park visitors, among employees of travel agencies, and among a small number of restaurant owners and hoteliers.
- Influence of the NP in choosing the destination: 30 % of respondents have been influenced heavily or partly by the existence of the national park. Only 5 % would not have come without the national park.
- Average spending per overnight stay: DM 50.80 (85 % for hotel or campsite and catering, 2 % for event tickets, 8 % for souvenirs, and 5 % for fuel).
- Turnover from tourism which has been induced by the national park: total overnight stays in the area (1.7 m) x ratio of tourists who have been influenced by the existence of the NP in choosing their destination (0.3) x average spending per overnight stay (DM 50.80) = DM 25.9 million. Please note, a multiplier factor has not been applied.

**Second example:** the Berchtesgaden National Park, Germany (Job et al. 2003, 113-132):

- 2.3 million overnight stays per year in the region; average duration of stay is 6.5 days; 1.13 million visits of the national park per year (calculated on the basis of sold parking tickets on the only existing parking lot plus an estimated number of people arriving by public transport or on foot).
- Survey among 1,879 visitors of the national park with a standardised questionnaire, including 23 questions.
- Influence of the NP in choosing the destination: 10.1 % of respondents have been influenced at least partly by the existence of the national park. Almost nobody answered that he or she would not have come without the national park. Among the 10.1 % were 14.5 % day visitors, 20.5 % short-term tourists (duration of the visit = 1-4 days) and 64.9 % long-term tourists (duration of the visit = five or more days). 10.1 % of the total number of national park visitors equals 114,083 people.
- Average daily expenditures: day visitors – 19.89 €, short-term tourists – 51.24 €, and long-term tourists – 51.19 €. On average, they spent 16.52 € on lodging, 17.10 € on catering, 2.49 € on transportation, 4.84 € on entrance fees, and 3.31 € on souvenirs.
- Net turnover (without VAT) from tourism which has been induced by the national park: 10.66 m €, including a regional multiplier factor of 1.3.
References


IUCN (= IUCN Commission on National Parks and Protected Areas) / WCMA (= World Conservation Monitoring Centre) (1994): Guidelines for Protected Area Management Categories. Cambridge, UK / Gland, Switzerland: IUCN.


Annex – Case study: Defining terms of reference for a Contingent Valuation of the project “Removing the Staicele dam in the Natura 2000 site the ‘Salaca River Valley’”

A-1 Linking theory with practice

As stated in the first chapters, the manual as well as the terms of reference of the case study are originally related to a training programme on economic evaluation of protection and management of Natura 2000 sites. The training seminars made evident that up to now there are almost no economic evaluations of Natura 2000 sites or even of protected areas in general in the Baltic countries. Therefore, it is largely unknown what economic value Natura 2000 has in Latvia.

There was also the wish among the Latvian conservation experts to get a practical example of how to apply the economic evaluation methods that have been introduced in the seminars and in this manual.

That is why a case study has been added as an annex to the manual. The intention is to exemplify how terms of reference for an economic evaluation can be drafted. As it has already been said in the introductory chapter of the manual, the objective is not to enable conservationists to carry out economic evaluations themselves, but to allow them to become competent partners of economists.

The removal of the Staicele dam has been selected as a case because it represents a very pressing real-world decision-making problem. The clear objective is to apply the terms of reference soon after finishing the ongoing project on ‘Management of Natura 2000 sites – needs, possibilities, perspectives” by raising funds for carrying out the evaluation in the frame of another project. It can be considered as direct outcome and implementation of management measures stipulated in the Natura 2000 management plans for the Salaca River.

The following chapter of the annex describes the preparatory steps of a cost-benefit analysis – from the analysis of the decision making problem to the definition of the scope of the study, and the physical quantification of impacts. Normally, this would have to be done by the conservation agency who wishes to contract an economic evaluation study.

Once the scope of the planned study is defined and the relevant impacts are physically quantified, the tasks of the economists can be specified. This results in the terms of reference. They refer to the elaboration of the evaluation design, the implementation of the evaluation, and reporting on the findings. The third chapter is dedicated to these issues with regard to the case.

A-2 Background information for the terms of reference

A-2.1 The Salaca River – one of the most important salmon spawning rivers in the Baltics

Salaca is the fourth biggest natural salmon (Salmo salar) spawning river in the Baltic Sea area. Initially, the Salaca River has been designated as a salmon reserve in order to protect its salmon population. In 1999, the Salaca River Valley Nature Park was established. It also includes the valley slopes and the adjacent riverbanks, thus combining the natural, landscape and cultural heritage values of the area. The nature park is a protected area of national importance and is included in the landscape protection zone of the North Vidzeme Biosphere Reserve. Furthermore, this area is equally significant on a European scale. Due to abundance of habitats of European importance, it has been included in the list of potential Natura 2000 site, which was submitted to European Commission in 2004. The mosaic layout of valley habitats reflects the features of a traditional rural landscape. As such landscapes are growing scarce today, it gives the park a particular value and a strong rationale for preserving it.

The total area of the nature park is 6,307 ha. It has a length of about 82 kilometres and an average width of only 0.5-2 km. Based on the habitat types of Annex 1 of the Habitats Directive, the Salaca River can be classified as water courses of plain to montane level with the Ranunculion fluitantis and Callitricho-Batrachion vegetation (habitat type 3260), while slopes of the valley are covered by western taiga forests (9010*), alluvial forests with grey alder (Alnus glutinosa) and ash-tree (Fraxinus excelsior) (91E0*), siliceous rocky slopes with chasmophytic vegetation (822), etc. Besides salmon (Salmo salar), river lamprey (Lampetra fluviatilis),
thick shelled river mussel (Unio crassus), otter (Lutra lutra) and pond bat (Myotis dasycneme) are among Annex 2 species quite common in the territory of the nature park. A small population of the hermit beetle (Osmoderma eremita) has also has been found there.

The key values of the Salaca River Valley are the Salaca River itself and the set of species and habitats they host. The most valuable habitats are riffle and rapid areas, forests of valley slopes and ravines (including grey alder (Alnus glutinosa) and mixed deciduous groves), biologically valuable meadows as well as one of the main characteristics of the Salaca River Valley – the limestone outcrops. From the species perspective, the most important are fish species, i.e. salmon (Salmo salar), river trout (Salmo truta), and river lamprey (Lampetra fluviatilis).

A management plan for the Natura 2000 site has been finalized in 2005. One of the most important and also one of the most controversial measures in this management plan is the proposed removal of a former paper mill dam in the town of Staicele, 45 kilometres up from the river mouth. The dam interrupts the fish migration path at the middle of the river, and as a result spawning capacity of the Salaca River is not utilized.

The dam of Staicele paper mill was built in 1893, thus blocking fish migration to the upstream regions of the Salaca River and the Lake Burtnieks. In 1984, the dam was taken down. However, its foundation, a 40-70 centimetres high and 10-12 metres long sloping threshold, was left standing, blocking the whole width of the river. Due to this obstacle, the fish migration upstream is possible only at high water level (in spring and sometimes in autumn after heavy rains), while during the rest of the year it seriously hinders the fish migration, particularly for species like river lamprey (Lampetra fluviatilis) and vimba (Vimba vimba). Salmon (Salmo salar) that could cross the remains of dam at high water level is not trying to overcome the obstacle and to migrate to the upstream parts of the Salaca River, either. For half of the century this migration route was closed, and the population has no more individuals born above Staicele. After the partial destruction of the dam in 1984, conditions for fish migration have improved (few cases of catching salmon (Salmo salar) and river trout (Salmo truta) have been registered in upper reaches of Salaca and the Lake Burtnieks), however, it still does not allow to reach the full spawning capacity of the Salaca River.

Currently, approximately five hectares of riffle or rapid areas with potential spawning sites can be found above the Staicele dam. If the dam were removed, it would lower the water level, increase the velocity of river flow and new riffle and rapid areas as well as spawning sites would appear.

The remaining threshold of the former dam is causing the accumulation of trees fallen into the river and other debris, which hinders fish migration even more and creates unsanitary conditions in this part of the river.

In the 1990ies plans appeared to rebuild the Staicele dam for the purpose of a hydropower station, and the area of the old paper mill including the dam was sold to a potential investor. However this initiative was stopped in 2002 when the Cabinet of Ministers adopted a regulation on “Rivers and stretches of rivers, where for purpose to protect fish resources, construction or renovation of hydropower stations or installation of any mechanical obstacles are forbidden”, and Salaca was included in the list of such rivers. Removal of the Staicele dam would be a very favourable signal for ecological requirements in general and for the implementation of the Natura 2000 network in Latvia in particular. In the whole country approximately 700 dams in rivers exist with more or less unfavourable consequences for the ecologic quality of the rivers. However, in most of these cases the situation is different. The dams are usually a part of functioning hydroelectric power plants and the rivers and streams are hardly comparable to the Salaca River in ecological terms.

The case study will focus on the costs and benefits of removing the main obstacle for fish migration in the river, the remains of the paper mill dam in Staicele municipality. The main effect of removing the dam would be a strong improvement of the quality of the ecosystem.

A - 2.2 Analysis of the decision-making problem

Staicele dam is constructed under the bridge, which belongs to the territory of the former paper mill now privately owned. Owners so far have not agreed on removal of the dam or selling it separately. They have offer selling the whole property-complex of buildings belonging to the paper mill factory. However, it is not clear as to the ownership of the dam, i.e., the river is public property yet the bridge is privately owned.

Currently, there are options for getting access to the dam remnants in order to destroy them. The first one that will be used by the government is to undertake a legal assessment of property rights. Other options include some sort of financial arrangements with the owners of the paper mill. The ultimate solution for removal
of the obstacle to fish migration could be expropriation of the dam. Present legislation does not provide mechanisms for such activity; therefore an individual legal act on expropriation of the Staicele dam would have to be adopted by the government. It can be assumed that economic argument plays a key role in the decision of the government on adoption of such legal act.

Economic analysis demonstrating not only the costs of removal, but also the benefits on a national scale could favour positive decision towards nature conservation interests. Therefore, it is initiated to carry out the cost-benefit analysis in parallel to the development of political options.

A - 2.3 Identification of information needs

As the constituency of the government and the parliament is the national electorate, the economic evaluation should yield results that demonstrate the benefits of the project for the entire nation and not only for the local residents or for any particular group of stakeholders.

From the viewpoint of a conservation lobbying group, it could be tempting to focus the analysis only on the potential benefits of the project. However, this would make the argumentation prone to criticism by opponents who would claim that the costs of the project outweigh the benefits. To be prepared for these objections and to deliver a balanced analysis, the costs of the project should also be calculated. Hence, the economic evaluation study needs to cover use values, non-use values, direct costs, indirect costs, and opportunity costs of removing the Staicele dam – all from the perspective of the national population.

A - 2.4 Definition of the project

The project in this case comprises the following components:

- Getting access to the remnants of the dam in order to destroy them: The dam and maybe some of the surrounding areas have to be acquired from the current owners by the government – either by purchasing or by expropriating it. In both cases a financial compensation according to market prices has to be paid.

- Removal of the obstruction to fish migration will include the following actions:
  - Firstly, a feasibility study should be carried out to define the best technical solution for removal of the obstruction. It shall evaluate if full demolition of the dam including the bridge is necessary, or is it sufficient to remove only a few segments of the dam, leaving the bridge in the same technical condition as it is now.
  - Based on results of the feasibility study, the technical project for removal of the obstruction shall be elaborated.
  - Removal of the obstruction shall be implemented by professional construction company.
  - The waste material has to be disposed of properly.

- Releasing of salmon spawns above the former Staicele dam. As hardly any fish have been passing the Staicele dam, the potential spawning sites which will be made available by its removal will not be accepted by the fish population. As salmons have the custom to get back for spawning to the place where they were born, it will be necessary to restart this circle by putting salmon spawns in the upstream regions of the Salaca River. Releasing of the salmon spawns shall include the following actions:
  - Collection of fish spawn at the river mouth of Salaca in autumn;
  - Growing of fish smolts in fish farm (ca. 7-9 month);
  - Releasing of the fish smolts of the youngest life stage as fry in June or one summer old parr in the beginning of September.

It is estimated that for achieving the desirable results the releasing has to be repeated at least 3 years and amount of the smolts should be ca. 50 000 per year.

A - 2.5 Identification of project impacts

In order to identify the relevant project impacts, first of all a summary of all possible impacts will be listed. In the next step – the definition of the scope of the study – the most relevant impacts will be selected by indicating also the reason for selecting those (selection key: additionality).

One of the key factors that influence biodiversity inside the potential Natura 2000 site are obstacles in the river which prevent migratory species from following their routes, e.g., salmon passing up the river for spawning.

The main impacts of the project are:

**Increase in the number of fish species and in the numbers of individuals; improvement of the quality of river habitats:** The project will help to improve status of different habitat types of river ecosystems, in
particular riffle and rapid areas which can be developed as spawning sites for salmon (Salmo salar) – by increasing velocity of the river flow and lowering water level above the dam a new spawning sites will appear. There will also be direct impacts for different fish species by opening the fish migration path into the upper regions of the river. Furthermore the destruction of the dam would prevent accumulation of debris and trees fallen into the river, which increase mortality of the fish, trying to overcome the obstruction, and creates visual degradation and unsanitary conditions in this part of the river.

**Increased attractiveness for tourists:** The scenic Salaca River Valley will get more comfortable for water tourism by removing the dam (at the moment boats have to be carried around the dam). However, it has to be kept in mind that the carrying capacity of the river valley for tourists is limited and that an increased number of tourists requires an upgrade of facilities.

**Improvement of conditions for fishing and angling** The project will support the economic development in the fishing and angling sector by offering favourable conditions for fish spawning – it is expected that amounts of fish populations (e.g. salmon, sea trout, vimba and river lamprey) will increase, which will increase also the fishing resources in the Baltic Sea, as well as potential increase of national fishing quota. Increase of fishing resources would also provide more working places in fishery sector

By improving fish migration conditions to the upper reaches of Salaca, this would increase attractiveness of this part of river for angling and by that promote also the angling tourism and related services in the municipalities above the Staicele.

**Stabilization of river bed and banks:** Demolishing the dam will contribute to stabilization of the river bed by reducing the flowing velocity of the water. Directly downstream the Staicele dam, the whole slope is danger to slide down due to constant erosion at the bottom. It is caused by the river which leaves the area of the dam with high velocity straight towards the bank of the river. The removal of the dam would relief the pressure of the river at that point.

These impacts can also be classified as economic values and costs (see fig. 15).

<table>
<thead>
<tr>
<th>Impact</th>
<th>Type of economic value or cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection of fish species and river habitats for fishing and angling</td>
<td>Direct use value</td>
</tr>
<tr>
<td>Protection of fish species and river habitats for the sake of biodiversity</td>
<td>Option value</td>
</tr>
<tr>
<td>Protection of fish species and river habitats for the sake of biodiversity</td>
<td>Existence value</td>
</tr>
<tr>
<td>Protection of fish species and river habitats for the sake of biodiversity</td>
<td>Bequest value</td>
</tr>
<tr>
<td>Increased attractiveness of the area for tourists</td>
<td>Direct use value</td>
</tr>
<tr>
<td>Increased attractiveness of the area for tourists</td>
<td>Option value</td>
</tr>
<tr>
<td>Decreased erosion through stabilization of the river bed and its banks</td>
<td>Indirect use value</td>
</tr>
<tr>
<td>Financial arrangements for getting legal access to the remnants of the dam</td>
<td>Direct cost</td>
</tr>
<tr>
<td>Demolition of the dam and disposal of waste material</td>
<td>Direct cost</td>
</tr>
<tr>
<td>Release of salmon smolts</td>
<td>Direct cost</td>
</tr>
<tr>
<td>Restoration of potential salmon spawning sites upstream from the Staicele dam</td>
<td>Direct cost</td>
</tr>
</tbody>
</table>

Please note that quasi-option values, indirect costs and opportunity costs are not mentioned in the table because they do play only a marginal if any role in this context. As it is forbidden by law to bring the dam into use again for power generation, there is no sensible alternative use of the edifice. Indirect costs do not apply either because this is a relatively small project with hardly any indirect negative effects. The same applies to quasi-option values - one could of course imagine some future use values of the natural river valley which are not known by now, however this seems to be highly speculative.

**A-2.6 Definition of the scope of the study**

Some of the values and costs are comparably easy to calculate:

- The direct use value of increased fish populations for fishing and angling can be elicited by taking the per-kilo prices of fish or by referring to the fees for angling licences.
- Similarly all direct costs can be calculated or at least estimated by taking market prices.

For these types of values and costs, no in-depth analysis is needed. The respective monetary values can be calculated by the staff of conservation authorities.
The study shall have the entire country of Latvia as its geographical scope.

The study should be focused on quantifying the
- the existence value and the bequest value of protecting fish species and river habitats for the sake of biodiversity,
- the option value of the potential direct use of fish species for fishing and angling for those people who actually do not practice fishing nor angling in the Salaca River,
- the direct use value and the option value of using the area for tourism and recreation,
- the indirect use value of decreased erosion through stabilization of the river bed and its banks.

Thus, the main types of values that ought to be calculated in monetary terms are option values, indirect use values, existence values, and bequest values. The common feature for all of these values is that there are no market prices available for quantifying them.

The above list of values to be calculated includes also the direct use value of using the area for tourism and recreation. There are no market prices for this value available because it is a hypothetic value. It is hypothetic because it does not refer to the current use value of the valley but to the increased value after the dam will have been demolished. It is difficult to tell what kind of tourism will develop in the area once the dam has been removed, how many tourists will arrive per year, how long they are going to stay and how much they are going to spend. Therefore, it is reasonable not to work with market prices but to apply valuation methods based on preferences.

In terms of target groups, the study shall calculate the monetary value of the project for the entire Latvian population.

With regard to the time horizon, the scope of the study shall cover one year. This means that it shall be calculated how much the Latvian population in total would be willing to pay per annum for the demolition of the Staicele dam and for increasing biodiversity in the river. This figure can be used for calculating the net present value of the project for the Latvian population by discounting and by taking also the costs into consideration (see chapter 4 of the manual).

### A-2.7 Physical quantification of impacts

The following impacts have been selected as the basis of the economic evaluation:
- Increase in the number of fish species and in the numbers of individuals as well as improvement of the quality of river habitats,
- increased attractiveness for tourism,
- improvement of conditions for fishing and angling,
- stabilization of river bed and banks.

So far the impacts have just been defined qualitatively. However, physical quantifications of the selected impacts are needed in order to carry out the evaluation study.

The quantitative dimension of the selected impacts can be estimated as follows:
- removal of dam could create ca. 2.5 ha of rifle and rapid habitats in the upper reaches of the Salaca.
- There are some estimates about the potential increase of the fish resources but they still have to be checked.

It is impossible to make exact forecasts about the future development of ecosystems. That is why these numbers are only estimates which are based on assumptions. However, they are quite conservative estimates which are in line with experiences from other similar projects.

### A-3 Proposed terms of reference for the economic evaluation

#### A-3.1 Summary of the background information and introduction to the terms of reference

The economic evaluation shall provide information on the value of demolishing the Staicle dam for the entire Latvian population. Because the decision on how to deal with the remnants of the dam will be made by the national government, the costs and benefits of doing so have to be shown for a national constituency.

The project in question basically has three components, i.e., getting legal access to the remnants of the dam; removal of the obstruction to fish migration; and releasing of salmon spawns above the former dam. The project will result in
an increase in the number of fish species and in the numbers of individuals,

an improvement of the quality of river habitats,

an increased attractiveness of the river valley for tourists

improved conditions for fishing and angling,

stabilization of river bed and banks.

Most of these impacts have already been quantified physically (see above).

The study shall cover use values, non-use values, direct costs, indirect costs, and opportunity costs of removing the Staicele dam – all from the perspective of the national population. However, the focus shall be on measuring option values, indirect use values, existence values and bequest values in monetary terms. The common feature that all of these values share is the fact that there are no market prices available for quantifying them.

The study shall have the entire country of Latvia as its geographical scope. With regard to the time horizon, the scope of the study shall cover one year. This means that it shall be calculated how much the Latvian population in total would be willing to pay per annum for the demolition of the Staicele dam and for increasing biodiversity in the river.

The Contingent Valuation method shall be used for the evaluation. This method is best suited to meet the information needs because it can be applied for eliciting both use and non-use values. It is especially appropriate if option, existence, and bequest values are to be calculated.

The contractor mainly has to fulfill the following work packages:

- Setting up the hypothetical market and designing the questionnaire,
- undertaking a pre-test and redesigning the survey,
- drawing a representative sample and obtaining bids,
- estimating bid curves,
- aggregating data,
- reporting.

All working packages have to be closely coordinated with the contracting agency.

**A-3.2 Setting up the hypothetical market and designing the questionnaire**

The Contingent Valuation in this case shall have a willingness to pay format because the majority of interviewees is supposed to receive a benefit through the proposed project.

The contractor shall prepare the questionnaire. It shall include four sections:

- information on the project “Removal of the Staicele dam” (maps, instructive summary of the project, and its likely impacts), and on the bid vehicle,
- questions concerning the interviewee’s willingness to pay (open-ended questions),
- additional questions on general socio-economic aspects like gender, age, education, and income,
- a fourth section which addresses the interviewers, and asks them for their feedback about the interview.

The information section shall begin with some questions concerning the existing level of information of the participants. They could be asked what they know about biodiversity in Latvia, about salmon populations, and about the effects of hydroelectric dams. Additional questions could refer to the actual use of the Salaca River. Then the interviewees should be given some information on the project. The information needs to be provided in a manner which ordinary people can understand easily. This section of the questionnaire should include two maps – one which shows the location of the site within Latvia and another one of the Salaca river valley, demonstrating the current blocking of fish migration. The overview map should also include marks for all (or at least for the most important) other similar dams in Latvia. Besides maps, there should be a verbal description of the project and its likely impacts. This text has to be relatively short because it shall be written aloud by the interviewers. It shall especially inform the respondents about the likely effects of the project on Salmon populations. It is of paramount importance to present the project not as an individual, isolated one, but to make clear that there are more than 700 similar dams in Latvia, which – if removed – would lead to similar benefits and costs. If this does not get sufficiently highlighted, there would be a high risk of running into a strong mental account bias.

The second section of the questionnaire with questions concerning the interviewee’s willingness to pay depends upon some sort of bid vehicle. It has to be specified how, i.e., by what means the respondents will be able to pay for the particular project on the hypothetical market. There could either be a mandatory tax, voluntary payments into a trust fund, or entrance fees. The proposal must be realistic, credible,
uncontroversial and familiar to the respondents. It would be best if the hypothetical market relied on routine or previously experienced behaviour of the respondents. The willingness to pay can be elicited by different types of questions, e.g., discrete or dichotomous, continuous or open-ended questions. In this case, open-ended questions shall be used because mean or median willingness to pay can be calculated more easily. The contractor also has to decide whether the bid vehicle should refer to a one-time or a per annum payment. However, a referendum format (e.g., “Would you be willing to be taxed x Lats to cover the costs of the project y?”) also offers some advantages. For instance, it is usually more realistic. The contractor has to identify a market design and a bid vehicle that best fit to the Latvian situation.

The third section of the questionnaire includes additional questions on general socio-economic aspects like gender, age, education, and income. This information allows to calculate population statistics and to carry out differentiated bid curve analyses.

In the fourth section the interviewers are asked for their feedback about the interview. There shall be questions on whether others had been listening while the survey was conducted and on ranking the difficulties the respondents had in answering each previous section of questions.

**A-3.3 Undertaking a pre-test and redesigning the survey**

The contractor shall conduct a pre-test of the questionnaire and subsequently revise the questionnaire. By applying the questionnaire to a few (20-50) test persons, it will soon become evident how clear the hypothetical market has been described and where there is a risk of misunderstandings. The aim is to identify areas where the survey may be misinterpreted and where questions lead to unexpected results.

The ordering agency shall be informed about the experiences with the pre-test and the modifications of the questionnaire. If needed, the method of training or the selection procedure for interviewers shall also be altered.

**A-3.4 Drawing a representative sample and obtaining bids**

The contractor shall conduct personal interviews with a representative sample of the total population of Latvia.

The contractor has to prepare a representative sample of the Latvian population. Against the backdrop of the size of the total population of approximately 2.5 million, the sample ought to comprise at least 500 individuals in order to be representative. The sample shall be created by using the standard methods of sampling in Latvia, which are applied in market research or opinion polling. The methods of sampling and the structure of the sample shall be discussed and coordinated with the ordering agency.

The bids can be obtained by mail shot, face-to-face surveys or telephone surveys. The interviews shall have the form of face-to-face talks because this can minimize the share of non-responses close to zero. Face-to-face surveys also offer practical advantages in maintaining respondent motivation and allowing use of graphic supplements. Personal interviews require the contractor to make appointments with all individuals from the sample and to visit them individually at home.

**A-3.5 Estimating bid curves**

The answers shall be processed with a standard statistical software package like SPSS. In the bidding section, protest bids and outliers shall be omitted.

Mean and median bids shall be calculated. Different bid curves shall be derived based on independent variables like education, age and income. It shall be checked how representative the sample really was for the Latvian population.

**A-3.6 Aggregating data**

Finally, the results of the survey shall be aggregated and interpolated to the total population of Latvia – both on the basis of the median willingness to pay and the various bid curves.
The final outcome will be a calculated estimate of how much money the Latvian population is willing to pay annually for the project “Removal of the Staicele dam” under certain specified assumptions.

A-3.7 Reporting

The contractor shall prepare two interim reports and one final report.

The first interim shall include the questionnaire and it shall explain how it was designed. The second interim report shall lay down the experiences with the pre-test and the modification of the questionnaire. Furthermore it shall inform on the methods and the results of the sampling process.

The final report shall include a full documentation of the entire study, i.e., the questionnaire and all other communication to respondents (e.g., advance letters), the structure and size of the sample, the overall sample non-response rate and its components (e.g., refusals), the item non-response on all questions, the quantitative results of the survey as well as of the statistical operations, and a description of potential problems and difficulties in conducting such a study in Latvia. The latter will allow learning lessons from this study for future evaluations of the same type.

A-4 Time frame and required manpower

The total run time of the project will be 12 months.

Months 1-2:

- Setting up the hypothetical market and designing the questionnaire
  Milestone: First interim report
  Estimated required manpower: 20 man days (scientist)

Months 3-4:

- Undertaking a pre-test and redesigning the survey
- Drawing a representative sample
  Milestones: First interim report; workshop with the ordering agency and with other experts to discuss the design of the evaluation study
  Estimated required manpower: 20-40 man days (scientist) (depending on the availability of representative population samples for Latvia) and 30 man days (student assistants)

Months 5-9:

- Obtaining bids
- Estimating bid curves
- Aggregating data
  Milestones: Final report
  Estimated required manpower: 100 days (scientist) and 300 days (student assistants)

A-5 Required qualification and experience of the contractor

The contractor must be an economic research institute with a track record of empirical social research, especially in the field of resource economics and valuation of public goods.

The contractor’s team shall include a professional statistician who is familiar with standard methods of sampling and statistical calculations.
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